Coal Age

MAY, 1956

A McGRAW-HILL PUBLICATION—PRICE 50c

Coke rate to dip as steel expands?

Get a factual answer to this question in the up-to-the-minute report on coal and steel trends, beginning on p 54

50% reject in the seam does not bar mining

How good maintenance and methods are combined to recover seam containing 30- to 36-in rock parting. p 62

Automatic control of specific gravity

How pre-set gravity is maintained in heavy-media vessels at Freeman No. 4. p 69

500 tons per shift from long face by 24 men

Good roof control, high recovery and lower supply costs mark planer mining at West Virginia mine. p 72

Full Contents on p 5

R-4 LAMPS—Brilliant, unfailing, effective light that means added safety for the miner, added production for the mine.

Spotlighting M·S·A Equipment

OF IMPORTANCE TO YOUR MINE SAFETY AND PRODUCTION

...at the Bluefield Coal Show

M·S·A BANTAM ROCK DUST DISTRIBUTOR—MODEL 400

Dust discharge rate of 100# min. through 25 ft. of 2" hose or 30# min. through 400 ft. of 2" hose. Special nozzle equips unit for wet rock dust application in fire fighting.

M·S·A PNEOLATOR—Effective, automatic artificial respiration device for all cases of impaired breathing.

M·S·A METHANE RECORDER

Continous charting of methane concentrations. Protects against unusual gas conditions, guides regulation of air volume.

M·S·A METHANE DETECTOR TYPE W-8

Portable, accurate unit for measuring methane content. Immediate, direct readings on clearly marked scales. Also, Type E-2 Tester pocket-size unit.

M·S·A DUSTFOE #66 RESPIRATOR

Light weight, compact, comfortable protection against dusts. Designed to give maximum vision. U. S. Bureau of Mines Approved.

M·S·A SELF-RESCUER

Emergency protection against carbon monoxide, smoke. Light, comfortable. Individual carrying case, or cache assembly for underground storage.

M·S·A CHEMOX® OXYGEN BREATHING APPARATUS

Complete breathing protection in any atmosphere for minimum of 45 minutes. Generates own oxygen from replaceable chemical canister. Light, comfortable. U.S. Bureau of Mines Approved.

M·S·A MINEPHONE COMMUNICATION SYSTEM—Improves haulage efficiency, safety. Messages dispatched instantly to all motormen, who can receive and reply while trips are in motion.

You'll want to see, and learn—first hand—the benefits this M·S·A equipment can bring to your mining operation by helping your efforts to step up mine production and increase over-all mine safety. Come in and discuss your special problems during the Bluefield Coal Show. We'll be looking for you.

MINE SAFETY APPLIANCES COMPANY

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82 Branch Offices in the United States and Canada

When you have a safety problem, M·S·A is at your service. Our job is to help you.

MSA

SAFETY EQUIPMENT HEADQUARTERS

B.F.Goodrich

Hose swallows coal that's dug out of a river

A typical example of B. F. Goodrich improvement in rubber

FROM the bottom of a nearby river comes the coal used in an eastern power plant. The coal, along with silt, sand and water, is dredged from the river, and pumped into this building where the coal is separated.

But there was one trouble. A hose connected the pipe to the tanks you see in the picture. And the sharp, gritty particles were wearing right through the hose in only nine months.

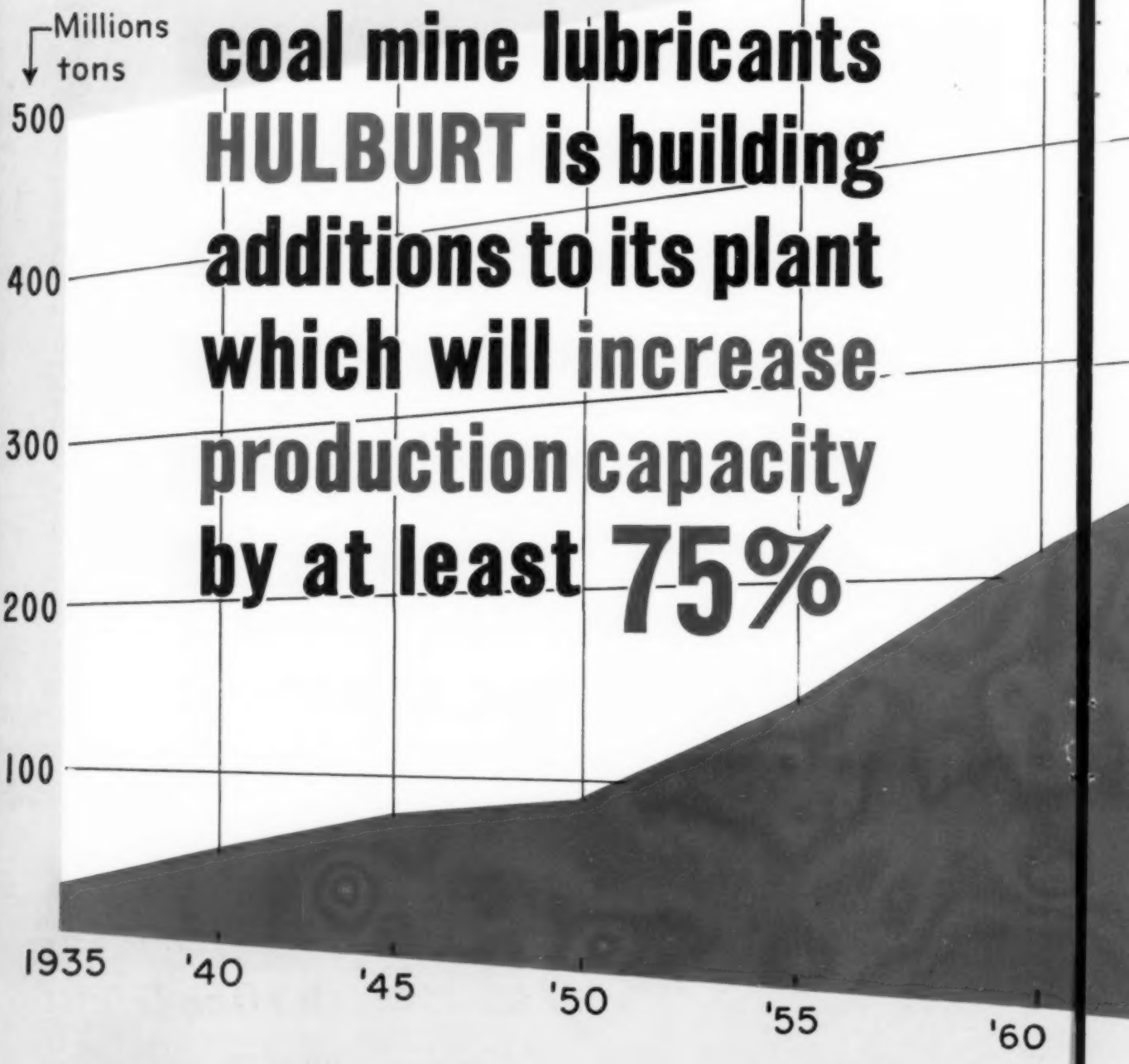
Then a B. F. Goodrich man heard about the trouble, and suggested a new B. F. Goodrich hose with a special lining made of the toughest wear-resisting rubber known. Another hose just like this has even swallowed 10-pound chunks of iron ore without damage. So, in this power plant, after 18-hour-a-day use for over a year, the B. F. Goodrich hose is still in such good shape that engineers expect it to last another three years.

B. F. Goodrich has made hundreds of improvements in dozens of kinds of hose to make them last longer, cost less. Most improvements, while making the hose stand more abuse, have also made it more flexible and easier to handle. B. F. Goodrich makes hose to carry almost anything—air, water, gasoline, steam, chemicals, and even dry materials such as flour or cement. Your B. F. Goodrich distributor is an expert at solving hose problems. Call him when you need help, or write *B. F. Goodrich Industrial Products Company, Dept. M-631, Akron 18, Ohio.*

B.F.Goodrich

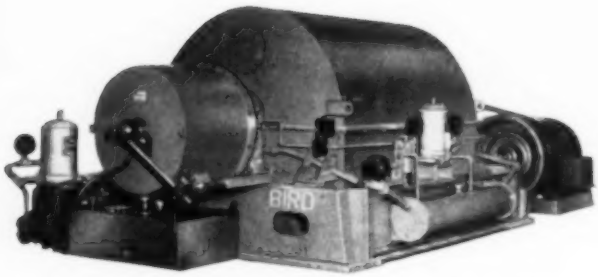
INDUSTRIAL PRODUCTS

To meet the growing demand for their coal mine lubricants HULBURT is building additions to its plant which will increase production capacity by at least 75%



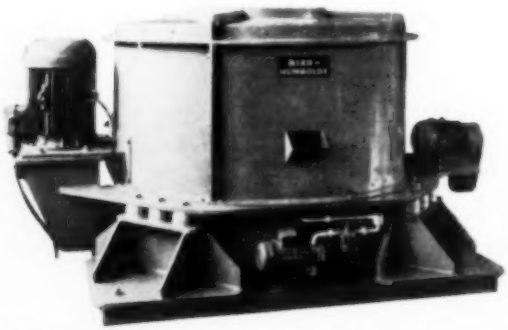

Millions tons
500
COAL USE FOR ELECTRIC POWER
400
300
200
100
HULBURT
QUALITY LUBRICANTS
Hulburt
QUALITY LUBRICANTS
HULBURT OIL & GREASE COMPANY
PHILADELPHIA, PA.
For 40 Years Specialists in Coal Mine Lubrication
'65
'70
'75

which should you choose to dewater your fine coal?



THE BIRD COAL FILTER

- Handles feed at any consistency that can flow — discharge right from the tables makes an ideal feed.
- The only equipment that does the complete job. No supplemental or auxiliary equipment required.
- Big capacity — built in three sizes to deliver up to a ton or more of ⅜" x 0 coal per minute.
- High recovery of coal — no coal losses in the filtrate.
- Controlled rejection of high ash fines when desired.
- Moisture content of delivered coal as low as can be obtained mechanically.
- Low overall cost.
- Continuous operation for months without overhaul.



THE BIRD-HUMBOLDT CENTRIFUGAL DRYER

- Handles pre-screened fine coal with power input of only 0.4 hp per ton.
- Long screen life — in excess of 500 hours, based on actual field experience.
- 98% or higher recovery of feed solids.
- Big capacity, 70-80 tons per hour.
- Almost no degradation.
- Delivers the coal at the low moisture content expected of a screen type unit.
- Low overall cost.

Only BIRD builds both. Only BIRD can help you make certain of the best and most economical dewatering equipment for *your* plant. Get in touch with BIRD before you buy.

BIRD
MACHINE COMPANY

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Builders of
SOLIDS-LIQUIDS SEPARATING EQUIPMENT
SOUTH WALPOLE • MASSACHUSETTS
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Coal Age

MAY • 1956

In this issue . . .

• Good roof control, maximum recovery of coal, lower supply cost and high output per face man are gains registered with a coal planer in longface mining at Amherst Coal. Averaging 500 tons per shift with 24 men, the planer operation is entering its second year of successful operation in the 40-in lower split of the Eagle seam in West Virginia (p 72).

• How closely will increased coal use follow the record steel expansion ahead? Why has there been a lag in plans for building new coke oven batteries? What are the prospects for greater use of anthracite in steelmaking? The article on p 54 will give you answers to these and other questions affecting coal's future in steel. Management should find the information helpful in making plans to meet the changing carbonizing needs of the steel industry.

On our cover

The airpick, a tool used by face workers to knock down coal that sticks to a mine roof, is seldom seen in U. S. mines. The miner in our photo is knocking down coal at Amherst's longface planer operation in West Virginia.

The coke oven battery is owned by a top steel producer. Although coke oven life is about 25 yr, many operate longer if maintenance is regular. Design improvements for new or renovated ovens can boost capacity as much as 25%.

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VOLUME 61 — NUMBER 5

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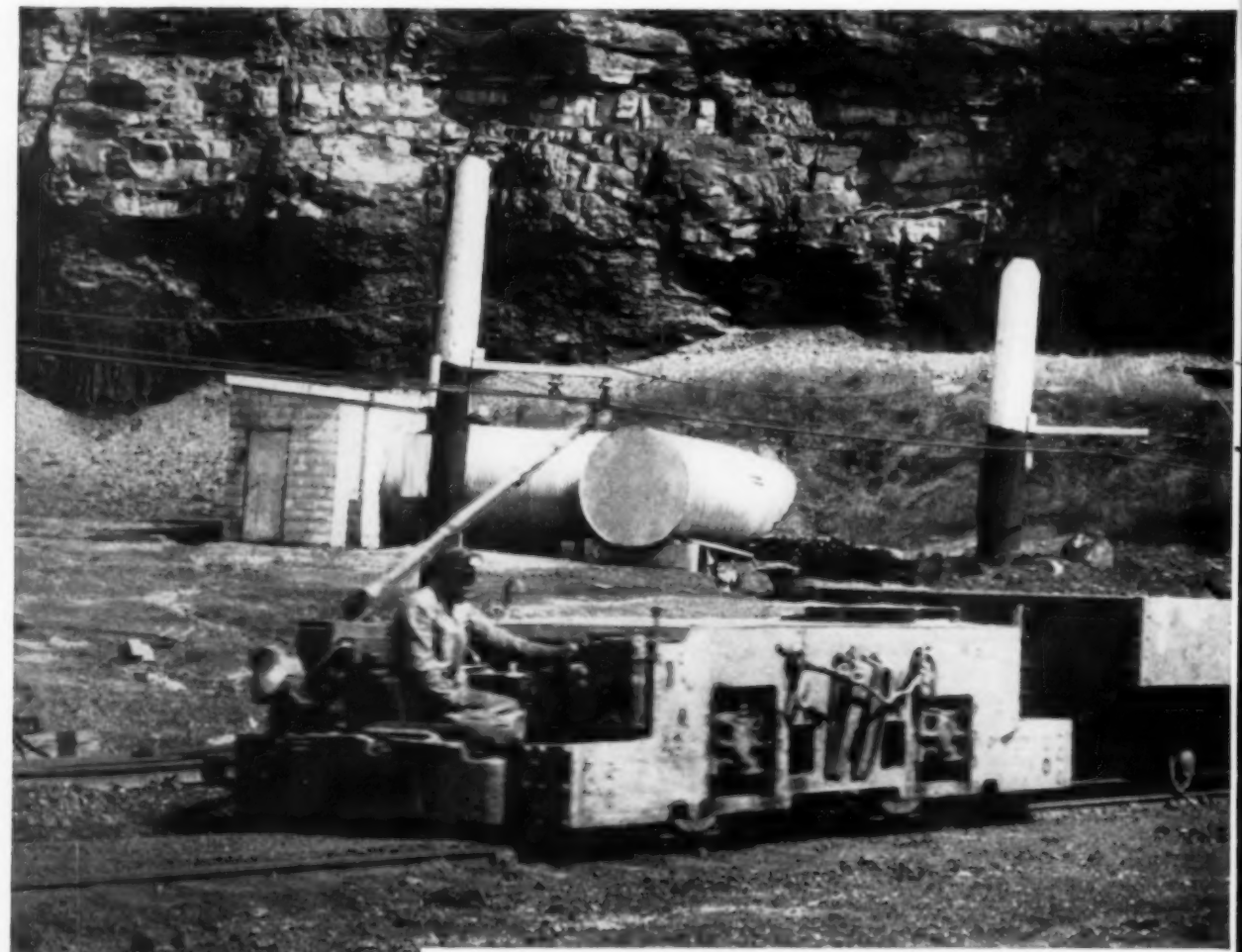

It's easy to get

TRAINS start more easily even at winter temperatures when wheels are lubricated with *Texaco Olympian Grease*. That's because this fine lubricant—known and used in mines everywhere—resists cold weather stiffening and keeps bearings fully lubricated regardless of the thermometer.

Texaco Olympian Grease is a special car wheel lubricant—equally effective in plain, cavity hub or anti-friction bearings. It has high resistance to oxidation, does not separate in service or in storage, and *stays in* the bearing. This means long-lasting protection and lower maintenance costs.

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TEXACO STAR THEATER
starring
JIMMY DURANTE
on television . . .
Saturday nights, NBC.

TEXACO

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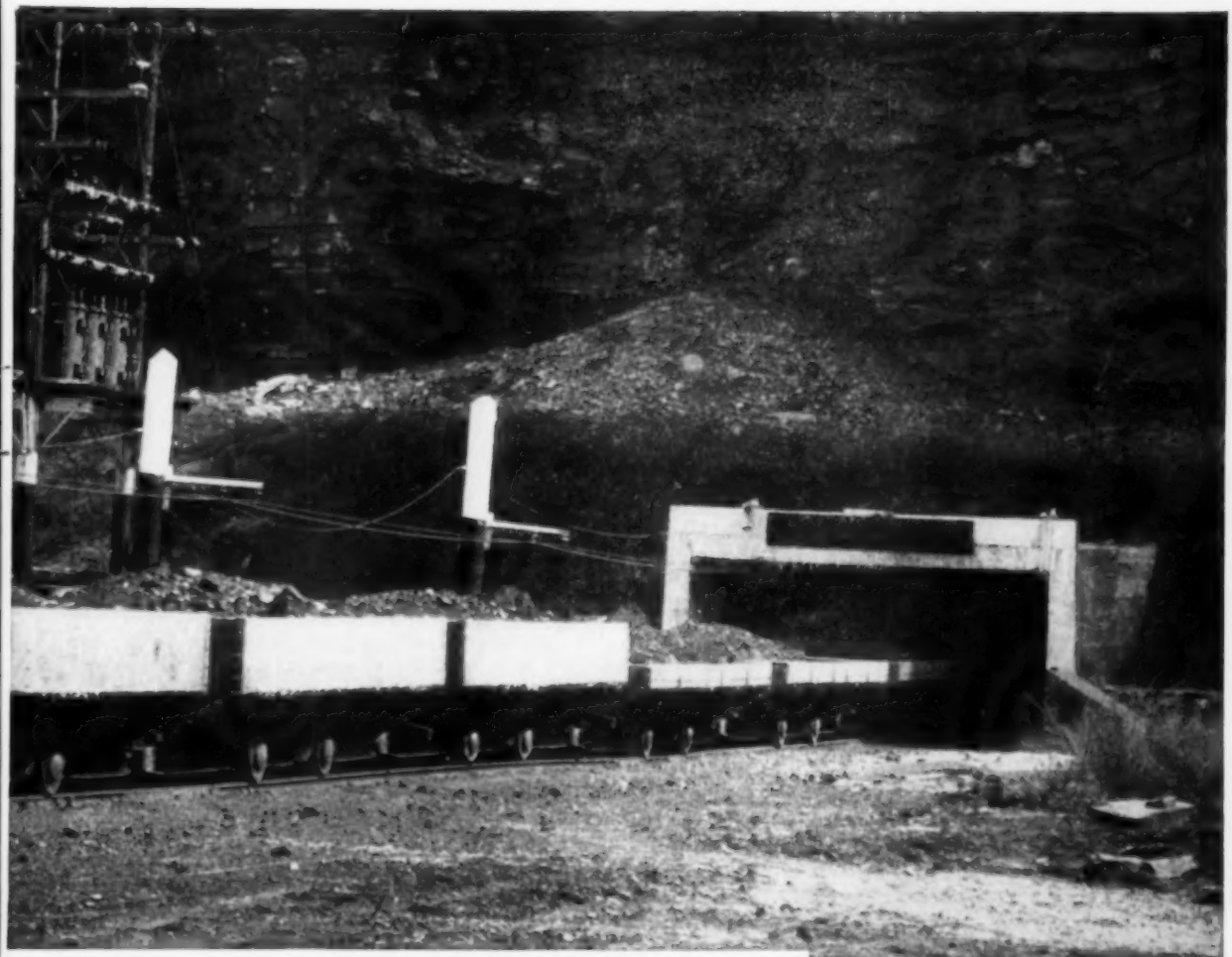


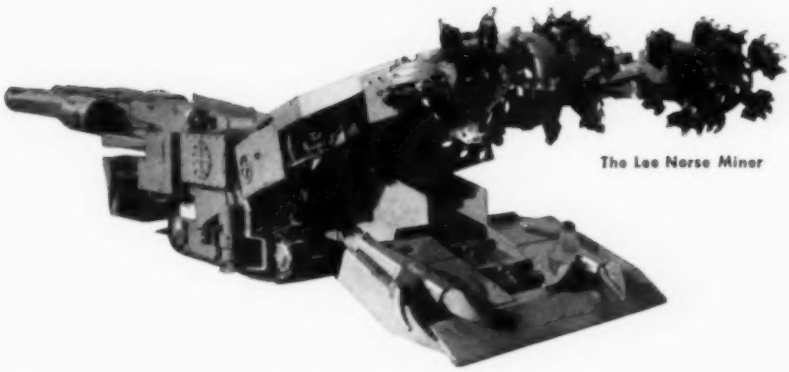
easier starts_

For effective lubrication of high-speed, anti-friction bearings in locomotives, cutters and other equipment—use *Texaco Multifak*. This multi-purpose grease resists oxidation, water and rusting; is highly stable. Because *Texaco Multifak* does many jobs, it simplifies lubrication, reduces errors, lowers costs.

A Texaco Lubrication Engineer will gladly help you select the proper lubricants for all your equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

VISIT THE TEXACO BOOTH, SOUTHERN APPALACHIAN INDUSTRIAL EXHIBIT, BLUEFIELD, W. VA. MAY 23-25

LUBRICANTS for the Coal Mining Industry



The Lee Norse Miner

70 tons of material per man at the face

Westinghouse SK motors stand up under tremendous loads and torque at Weirton coal

Mining operations, such as this cutting through tough Pittsburgh draw-slate, call for the rugged, dependable power that has made Westinghouse SK motors the first choice of the mining industry.

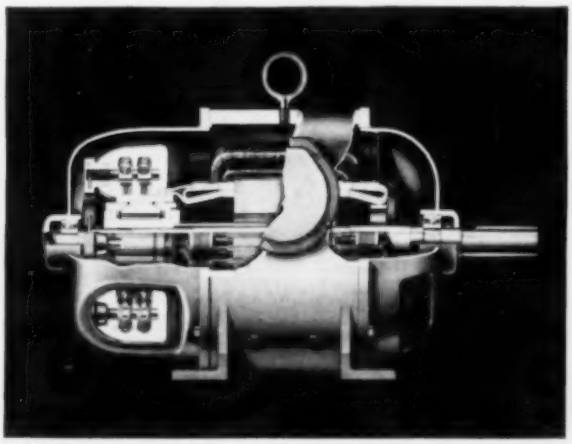
To get day-in, day-out production at Weirton and other mines, the Lee Norse Miner shown here needs *compact* power. Westinghouse answered this need by designing a special water-cooled, explosion-proof motor for more horsepower in a smaller space.

Get all the facts about Westinghouse SK motors, both standard and special, by calling your Westinghouse sales engineer today. J-21934

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

The muscles of this Lee Norse Miner are three 40-hp, water-cooled, explosion-proof SK motors and two 10-hp, explosion-proof SK motors. All the cutting is powered by only two of the 40-hp units.



Westinghouse builds a complete line of SK motors for the mining industry. The dependability of SK motors comes from (1) 600-volt insulation, (2) large commutator bars, (3) heavy-duty cast brass brushholders, (4) 4-way, sealed-for-life bearings.

WANTED!

BY AMERICA'S BEST MINES!

THE MAN FROM WEST VIRGINIA STEEL

"Ches" Plott, our bolting engineer, specializes in working with difficult roof-bolting conditions. In this capacity, he has worked with personnel in America's leading mines helping them solve irksome problems.

Perhaps you're not one of our valued customers, but if you hit a trouble spot telephone "Ches" collect. He'll be right there—no obligation, of course.

CALL HUNTINGTON 7174 . . . Ask For "CHES"

WEST VIRGINIA'S CONE NECK UNIT PERMITS EASY WASHER INSTALLATION ON THE JOB.

- *GREATER ECONOMY*
- *GREATER SAFETY*
- *PROMPT DELIVERY*

west virginia steel and mfg. co.

BOX 316 **HUNTINGTON, WEST VIRGINIA**

THREE SHARP BLOWS

AND YOU'RE DONE!

(That's all it takes to install a **TIGERWELD** *Wedge-type Bond)*

Our Tiger got a little mixed up. What you do is hammer the *wedge* on this Tigerweld Bond. Just three sharp blows and you've got a durable, low-resistance bond that is easy to remove if the track must be relocated. It hangs on in service, though. Is so dependable, in fact, that many mines use Tigerweld Wedge-type Bonds for permanent trackage.

Since no welding is required, and no precision drilling, you can save time and money with this bond wherever you use it. Write for complete information.

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ENGINEERING REPORTS:

Powered by General Electric system . . .

World's biggest shovel removes 90-foot overburden

60-cu yd. Marion shovel permits profitable coal recovery by Hanna at a 20:1 ratio of overburden to seam depth

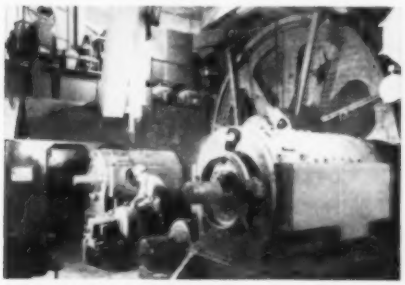
Speeding production for Hanna Coal Co., Division of Pittsburgh Consolidation Coal Co., *The Mountaineer* now makes possible profitable strip mining of coal from 41½-foot seams under an average 90 feet of overburden. A product of Marion Power Shovel Co., the machine is designed for dependable, round-the-clock, 45-second duty-cycle operation.

Among the highlights of its specially engineered electrical system, designed and equipped by General Electric, are: 14 main G-E motors with total rating of 7500 hp, but actually capable of producing twice that amount—including the largest d-c mill motors ever built; 6.9-kv distribution voltage—a new high for power shovels; and amplistat**-controlled performance.

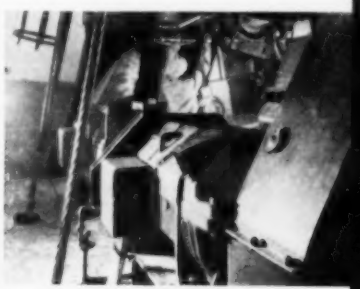
In any phase of mining, G-E engineering and equipment can combine to help you increase production. For information, call your G-E Apparatus Sales Office, or write General Electric Co., Section 660-34, Schenectady 5, N.Y.

G-E ANALOG COMPUTER, enabled engineers of Hanna, Marion, and G.E. to complete in two weeks calculations on design and performance that might have taken three years.

4 RUGGED G-E vertical armored d-c motors, developing 1900 hp, give top performance on high-capacity, heavy-duty swing-motion.



HIGH DEPENDABILITY on a demanding application is provided by four G-E d-c mill motors developing 5000 hp for hoist-motion, equipped with Tri-Clad '55'† blower motors.



SHOCK-RESISTANT G-E armored motors, atop frame, power crowd-motion. Sturdy design helps assure long life on rugged duty.

ABUNDANT DC POWER for operating needs is supplied by two large G-E motor-generator sets. Synchronous motors drive seven generators, which develop 6000-kw peak output.

FINGER-TIP CONTROL of operating functions is provided by adjustable-voltage system with responsive G-E Amplidynes*.

SPEED CONTROL with protection from heavy impact loads during repeated bucket loading, plus simple one-man operation is provided by reliable G-E amplistat control panel.

PROPELLING SHOVEL, four 250-hp G-E wound-rotor motors, powering 8 crawlers, are controlled at second operator station.

*The Amplidyne—rotating amplifier developed by General Electric.
**Amplistat—static amplifier developed by General Electric Co.

†Reg. trade-mark of General Electric Company.

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC

NOW – the BIG DRILL

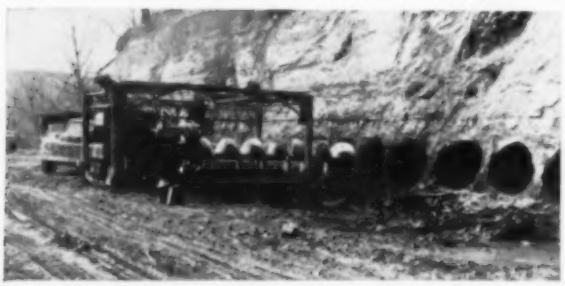
for CONTINUOUS

Take Up to 700 Tons Per Day–
with Three Men from "Worked Out" Strip Mines

CARDOX AUGER MINER (surface)

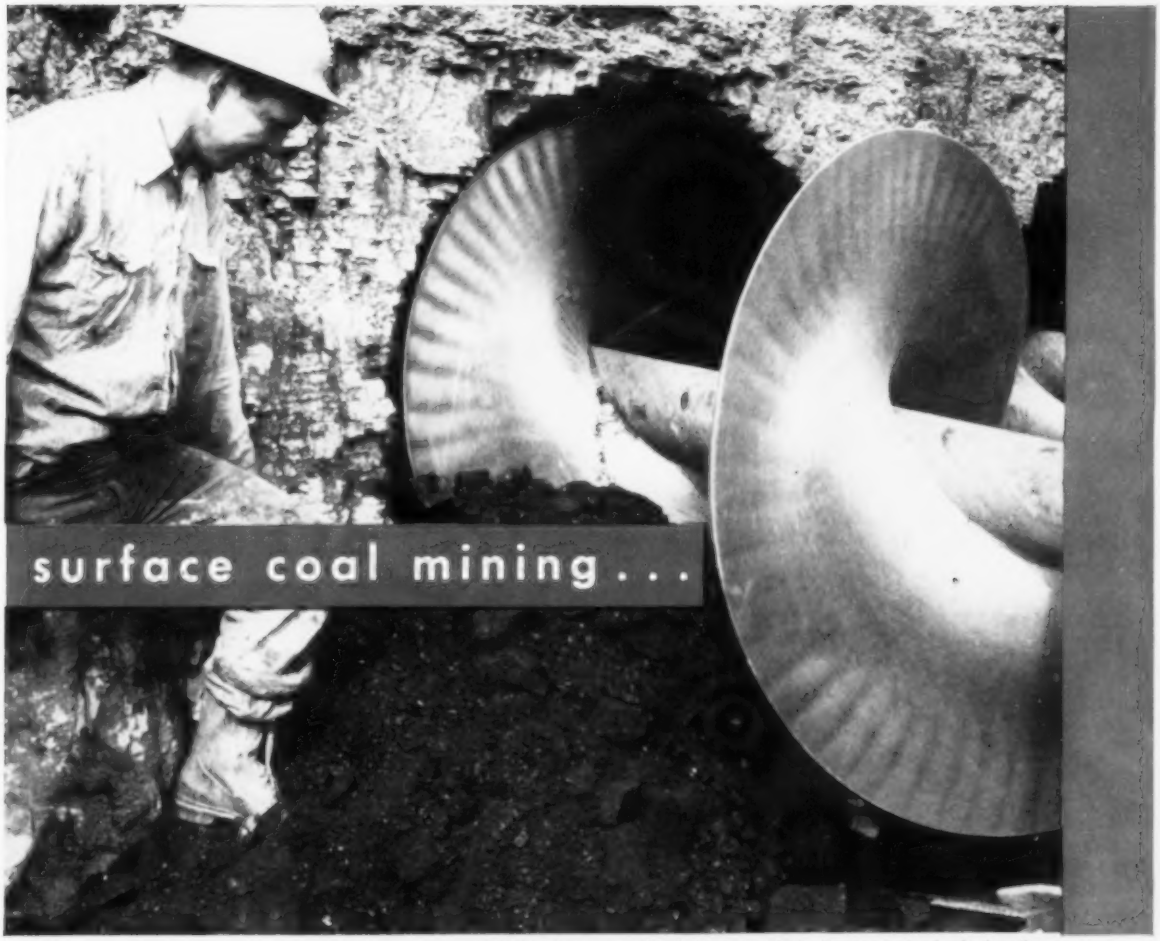
Here is the latest and most profitable way yet to mine good coal from mines seemingly "worked out," because of excessive overburden. In fact, it is the cheapest method yet developed to bring out coal, on a per ton basis.

"Big brute" of the CARDOX line, the 235 Surface AugerMiner is already running up remarkable records with "downtime" practically eliminated. Designed from end to end to bring out *more* coal at *lower* cost, it reduces drilling time per ton produced. There are a number of good reasons why.



Notice that while one hole is being drilled, the augers remain in the other. Then as sections are needed in the new hole, they are withdrawn and added. This means continuous mining in its most economical form!

Coal comes out of the hole in a continuous flow, ready for mechanical loading onto waiting trucks by elevator conveyor. Manual handling is eliminated.



Drills like this one — making holes up to 50" in diameter and going back as far as required — can bring out as much as 700 tons in a day, with a maximum of three men.

It has the capacity

In a pit mine with an exposed seam, it can easily mine as much as 700 tons per day with a maximum of three men. Yet it requires only 26′ of pit width. It is the only machine to operate efficiently in so limited an area.

Maintenance is simple

The entire machine is designed for easy maintenance — *even though this is seldom required.* Most wearable parts can be removed and replaced without dismantling the machine. This means less downtime and repair time.

Operates in 26′ pit

Its compact construction helps this unit to produce maximum quantities of coal in minimum working space.

Self positioning

The self-positioning feature of the CARDOX 235 AugerMiner is unique in the entire field of surface mining equipment. There are no rails, no skids or separate power units required for moving. It is self-positioning to and from the face as well as from hole to hole.

Hydraulic jacks with a 6-foot range allow for accurate positioning in seams, and permit holes to be drilled one over the other for greater recovery. Auger sections are stored in the completed hole and recovered as needed for the new hole being drilled.

All-in-all, we believe that in the CARDOX 235 AugerMiner you will find the most advanced equipment yet devised for economical mining of coal. A CARDOX Engineer will be glad to give you complete data. Write today.

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West Kentucky Coal Co. Adopts NO. 500X FLEXCO HINGED BELT FASTENERS

All Gathering and Panel Belts in Pleasant View and East Diamond Mines of West Kentucky Coal Co. are now joined with No. 500X FLEXCO Hinged Fasteners. The use of the No. 500X Fasteners results in longer splice life, less down time, faster application with light tools and the elimination of a heavy application machine.

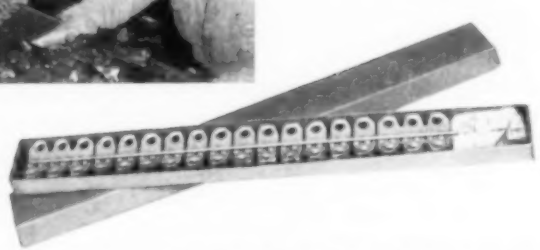
Will Cobb, Superintendent of Maintenance.

"We installed the first FLEXCO 500X test joints in September, 1953. Some of the original joints are just now being taken out of service — many have been in service over 2 years. We're 100% for the 500X Fastener and plan to extend its use to our other mines."

Volney Wright, Superintendent of Pleasant View Mine.

"We've tried them all. 500X Fasteners are best for our purpose. We're *getting more tonnage now because belt maintenance is reduced to a minimum.*"

Here Superintendent Wright and his Pleasant View belt team "Big Mac" McElroy, "Little Mac" McElroy, and "Red" Dunning are making an inspection. Regular belt and joint inspection is company policy. These men say "the new nylon cable hinge pin is tops . . . never have any pull-out at edges of the belt with No. 500X . . . the fasteners stand up and we often re-use them . . . two of us make a 30" joint in 15 minutes . . . the new FLEXCO Speed Tools certainly cut application time."



Standardize on FLEXCO No. 500X Fasteners

- Packaged joints — complete, convenient, no waste.
- New nylon covered pin — troughs better — does not work out.
- New Speed Tools cut application time.
- Stocked in all coal mining areas.
- Field engineers are ready to assist you.

(Fasteners also available in bulk — nylon pin stock in 100 ft. and 200 ft. rolls.)

Ask for Bulletin No. 500X

See Your FLEXCO Distributor

FLEXIBLE STEEL LACING CO.

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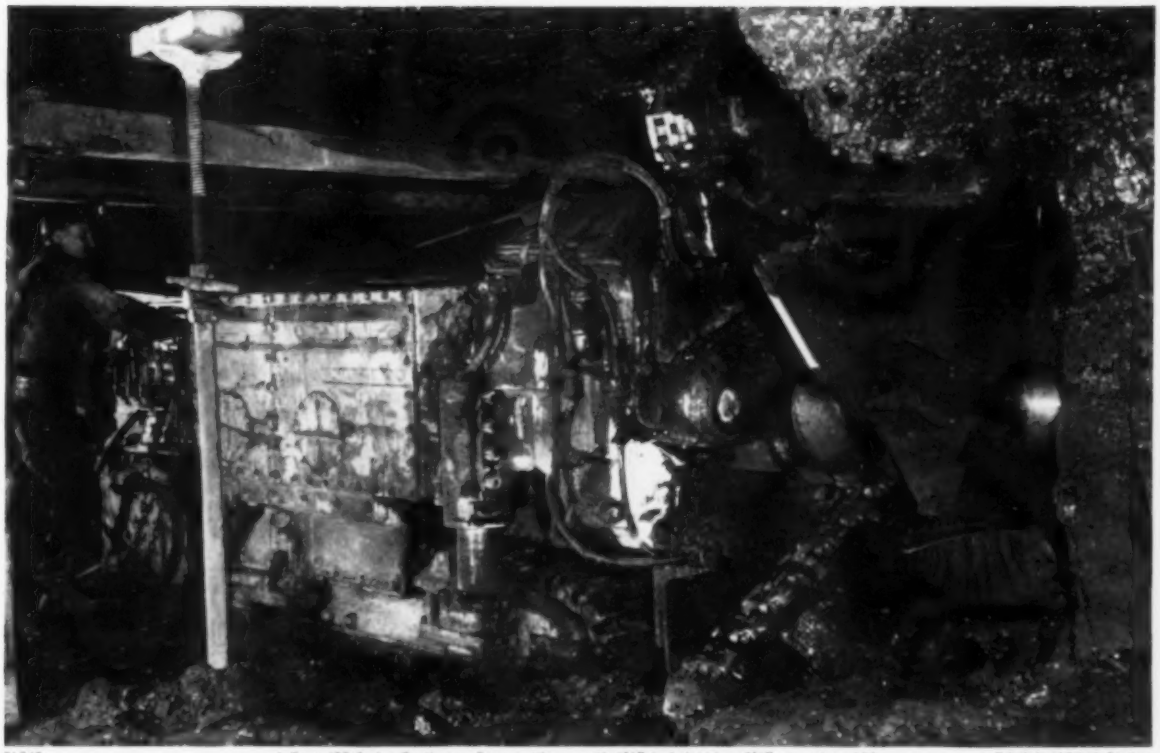
FLEXCO HINGED 500X BELT FASTENERS



21249 A Type 400 Series Continuous Borer cutting a path 6'6" in height by 12'4" at center width. Patented and Patents Pending

FOR HIGH TONNAGE TODAY

...and ample capacity to meet still greater demands of tomorrow

GOODMAN Continuous BORER

This giant will cut and load coal at the rate of 8 tons per minute. It drives entries, rooms, crosscuts and is highly successful in pillar extraction work. It has tremendous power . . . amazing strength . . . and practical mobility for moving about the mine. In other words, the Goodman Continuous Borer has advantages that add up to highest efficiency at the working face.

The Goodman Borer provides other benefits, too. For example, hazards associated with drilling and blasting are eliminated; chances of accidents at the face are reduced; fewer men and fewer working faces are needed to produce tonnage goals; supervision is closer. The Goodman advances rapidly so rooms are kept open but a short time, thus reducing the possibilities of roof falls; improved roof conditions promote better recovery in rooms and pillar extraction. And at the cleaning plant, rejects of raw coal are kept at a minimum since contamination caused by blasting and roof falls is extremely low.

Add up these advantages. They're important to you. They are the reasons why an investment in a Goodman Continuous Borer can be written off so soon in terms of greater productivity and lower cost per ton.

The new Goodman Rope-Belt Conveyor can be installed and extended more easily and quickly than any other belt conveyor made.

21432 Patents Pending

Want details? Write us today.

GOODMAN
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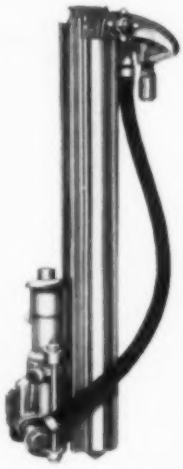
Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

28" FEED

46" FEED



64" FEED

Remove Snap Ring

Remove Chuck

THE LE ROI-CLEVELAND S20 VAC-NU-MATIC STOPER

All models available in either SAV-A-CHANGE or Socket Type Chuck

● The new CLEVELAND S20 VAC-NU-MATIC dust collecting stoper is available in 3 feed lengths to suit any working height down to a 26" seam. *It will produce a 30" hole in a 26" seam without using coupled steel.* The 28" feed weighs 69 lbs. complete. Any model may be used either hand held or jumbo mounted. VAC-NU-MATIC bits are fast and free cutting and eliminate all stuck steels. Dust collection is positive even in wet top. Chucks may be replaced without dismantling the machine, using only a pair of snap-ring pliers. Cuttings are removed at the chuck housing and do not pass through the machine. Write for bulletin RD32 or let us demonstrate in your own mine.

For sales, service, information or demonstration in Pennsylvania and West Virginia contact: Schroeder Brothers — 3116 Penn Ave., Pittsburgh, Pa. or Acme Machinery Co. — Williamson, W. Va. In the Birmingham district contact Equipment Service Co., 617 North 9th St., Birmingham, Ala., or contact us direct from anywhere.

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

Manufacturers of Cleveland Air Tools

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

RD-75

Use mining equipment?

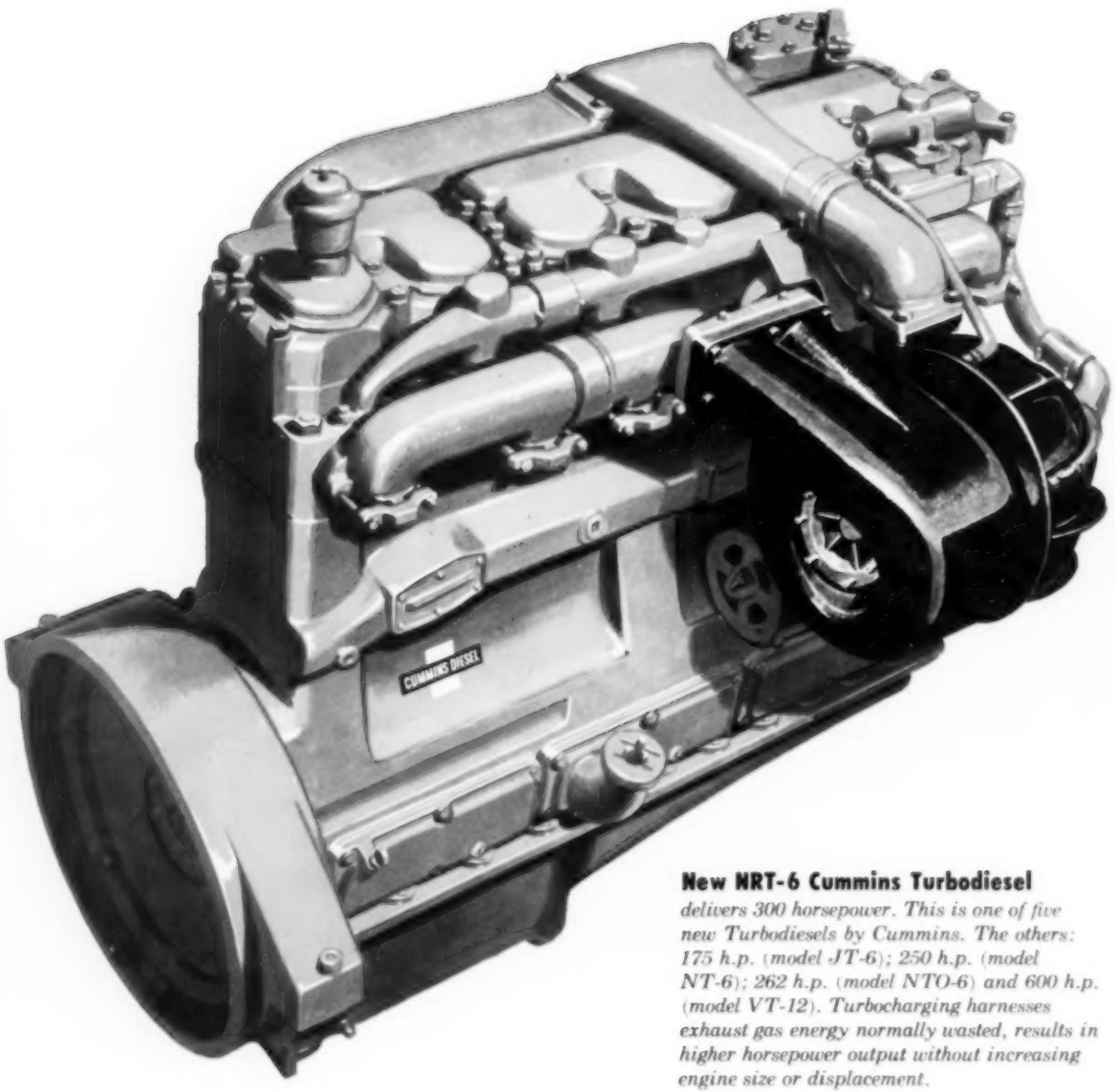
. . . now you can

STANDARDIZE ON CUMMINS

CUMMINS *diesels give you the* ***big plus*** **MORE PROFIT**

CUMMINS

diesels deliver f



New NRT-6 Cummins Turbodiesel
delivers 300 horsepower. This is one of five new Turbodiesels by Cummins. The others: 175 h.p. (model JT-6); 250 h.p. (model NT-6); 262 h.p. (model NTO-6) and 600 h.p. (model VT-12). Turbocharging harnesses exhaust gas energy normally wasted, results in higher horsepower output without increasing engine size or displacement.

features you need.... profits you want

1	**Exclusive PT fuel system** now standard on all Cummins Diesels. Easier to understand, simpler to service than any gasoline system or any other diesel fuel system.	Drastically reduces fuel system maintenance costs. Eliminates fuel racks, check valves, injection valves, timing adjustments.
2	**Cummins exclusive injectors,** open-type combustion chambers, and 4-cycle operation give highest on-the-job efficiency . . . and maintain it throughout operating range.	With Cummins Diesels, you can cut fuel costs from $200 to $500 or even more for every thousand hours of operation (compared with other diesel engines).
3	**Continuing research,** exacting engineering standards, and strict quality control assure product uniformity and high-quality, rugged heavy-duty design.	You get more operating hours between overhauls, less in-between maintenance and less unscheduled downtime when you use Cummins Diesels.
4	**Twenty-four** basic Cummins Diesels of 60 to 600 h.p. provide a wide selection of power. There are over 150 models—plus a wide variety of accessories—to match every individual job.	By matching power to your job you avoid the possibility of excessive maintenance and fuel costs resulting from under-powering . . . excessive initial costs inherent in over-powering.
5	**Standardization** of internal parts. Bearings, pistons, crankshafts and other parts are interchangeable for many models.	Reduced inventories and greater parts economy are made possible by this standardization. You get lower over-all maintenance costs.
6	**Worldwide** service and parts supply. Cummins Distributors carry all parts necessary to keep your engine running in top form . . . have factory-trained experts available to give immediate service.	Service and parts are available in nearly 200 locations in the United States and Canada and in over 100 export locations—help cut on-the-job delays.

Cummins Diesels are available in the leading makes of mining machinery. On the following pages are shown the makes of equipment in which you can obtain the advantages of Cummins Diesel power.

Before you place an order for new equipment, make sure you're getting lowest fuel and maintenance costs, minimum downtime, longest life. Specify Cummins and be sure you get all these diesel advantages.

CUMMINS DIESELS

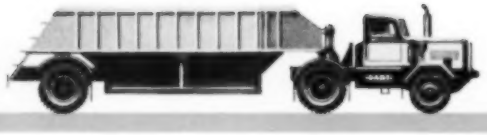
give you the **big plus**

MORE PROFIT

CUMMINS

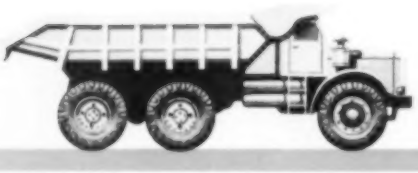
diesels now available in

AUTOCAR end-dump truck with 10 ¼ yard rock body. One of many Autocars with Cummins as standard power.



DART 50-ton coal hauler powered by 300 h.p. Cummins. Cummins Diesels are standard power in these coal haulers.

DART 18-ton underground shuttle truck. Available powered by 300 h.p. Cummins Diesel torque converter unit.



EUCLID 50-ton end-dump truck. One of many Euclid dumps and coal haulers that can be powered by Cummins.

FOUR WHEEL DRIVE quarry and mine maintenance truck. One of two FWD's available with Cummins.

HAYES, model HD series dump truck. This Canadian-built truck is powered by 165 horsepower Cummins Diesel.

HENDRICKSON 40-ton dump truck. One of twelve Hendricksons available with Cummins Diesels.

IH 35-ton quarry truck with twin side-dump. There are 17 other IH trucks you can buy equipped with Cummins.

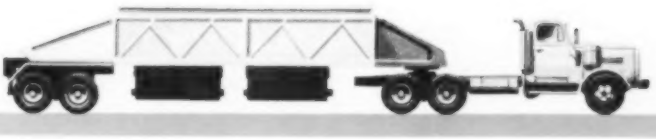
KENWORTH 24-ton end-dump truck. One of many Kenworth models in which Cummins Diesels are standard.

MACK 34-ton end-dump truck. One of fifteen different Mack models available with power by Cummins.

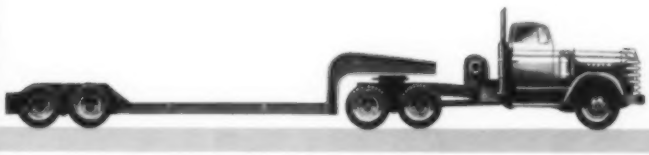
PETERBILT end-dump truck with side-dump trailer. One of 6 Peterbilt trucks in which Cummins power is standard.

WALTER, model ACBS Snow Fighter equipped with a 200 horsepower Cummins Diesel.

in these famous-make TRUCKS



COOK 30-ton bottom-dump truck. Cummins Diesels also available in end-dump and ready-mix units.



DIAMOND T 921 series tractor with low-boy trailer. Ten Diamond T models available with Cummins Diesel engines.

OSHKOSH 35-ton haul.ng truck with side dump trailer. One of eleven Oshkosh models available with Cummins Diesels.

PACIFIC 11-yard end-dump truck. One of many Pacific trucks in which you get Cummins as standard power.

WHITE 35-ton bottom-dump gravel hauler. One of thirty-four White-built trucks available with Cummins Diesels.

For over twenty years, major mine operators have picked Cummins Diesels as the top engines for heavy-duty off-highway trucks. Today, Cummins continues to be the first choice for the rough, tough haulage jobs.

Dependable day-in, day-out performance, ability to get more work done, long life, and lowest possible fuel and maintenance costs are a few of the reasons for this leadership.

In addition to heavy-duty earth haulers, Cummins Diesels are also available in smaller trucks used as dumpers in over-the-highway service.

When you buy new heavy-duty or medium heavy-duty mining trucks, get maximum efficiency . . . top profit. Specify Cummins.

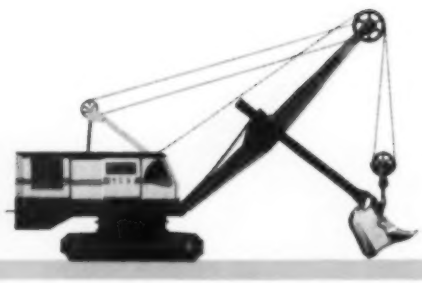
CUMMINS DIESELS

give you the big plus

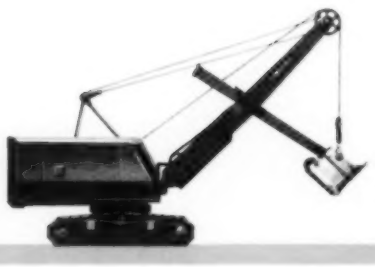
MORE PROFIT

CUMMINS

diesels now available i



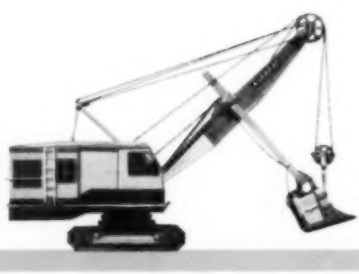
BUCYRUS-ERIE 2½-yard shovel. Cummins Diesels are also available in Bucyrus' 1½- and 4-yard shovels.



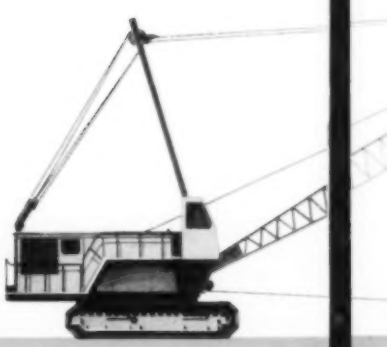
LINK-BELT SPEEDER 2½-yard shovel. Link-Belt Speeder also makes two draglines available with Cummins.

DOMINION backhoe. This unit, convertible to other front-end attachments, is available Cummins powered.

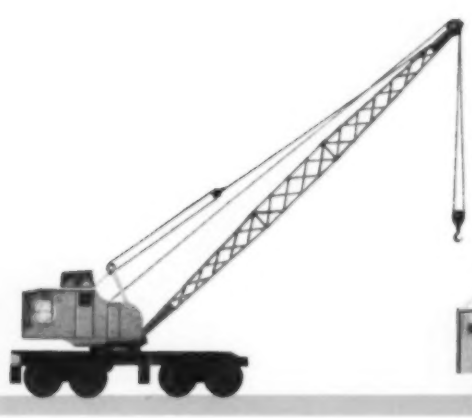
AMERICAN crawler crane. Cummins are available in the 700 series of American shovels, backhoes, and cranes.



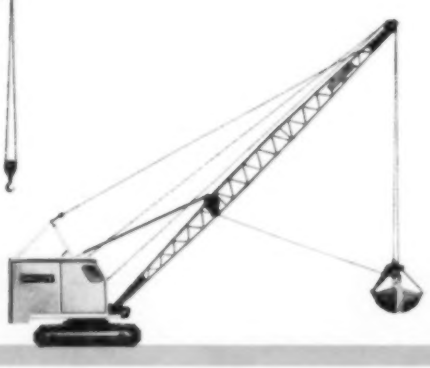
KOEHRING 2½-yard shovel. A 275 h.p. Cummins torque converter package is available in this unit.



MANITOWOC 5-yard dragline. Manitowoc also powers five shovels (1- to 5-yard) and a crane with Cummins Diesels.



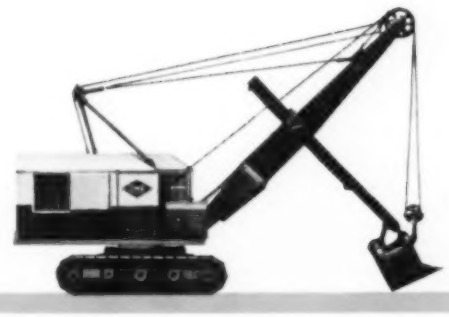
INDUSTRIAL BROWN-HOIST rubber-tired diesel-electric crane. Available in capacities from 25 to 60 tons.



BAY CITY BAY CITY clamshell. Bay City's crane and 1½-yard shovel also feature Cummins Diesels as standard equipment.

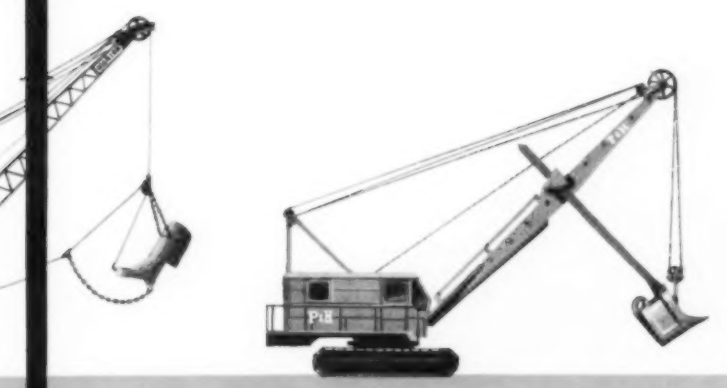
MARION dragline. One of three draglines, six shovels (1¼- to 4-yard), two cranes—available with Cummins power.

in these famous-make



LIMA 2½-yard shovel. Eight different Lima models (¾- to 4-yard) can be bought equipped with Cummins Diesels.

INSLEY 1-yard clamshell. Also as shovel, hoe, dragline, crane: on crawler, truck, or self-propelled mounting.



P&H model 1055 3½-yard shovel. Also available as a dragline, crane and clamshell. All available Cummins powered.

SHOVELS DRAGLINES CRANES

Cummins Diesels in your shovels, draglines, or cranes assure you of longer equipment life, lower maintenance and fuel costs . . . performance you can count on. That's why leading manufacturers make their ¾- to 5½-yard shovels available with Cummins Diesels.

Cummins engines for mechanical drive shovels have been engineered to include the best torque characteristics, controls, and accessories for each model of machine.

To assure best performance and lowest operating cost, torque converter units have been specially designed by Cummins to fit individual shovel models. Shovels equipped with Cummins torque converter units maintain power without lugging, stalling, or overspeeding. On the job, they have increased production by 30% to 50%. The hydraulic coupling effect of torque converter units also reduces maintenance costs on cables and machinery by absorbing shock loads.

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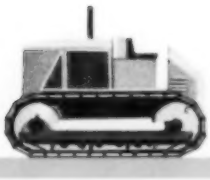
give you the big plus

MORE PROFIT

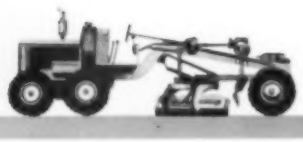
CUMMINS

diesels now available i

INTERNATIONAL HARVESTER model 75 Payscraper. Model 55 Payscraper is also Cummins powered.

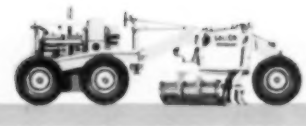


EIMCO model 105 crawler tractor. Eimco also makes a bulldozer and tractor-loader available with Cummins.

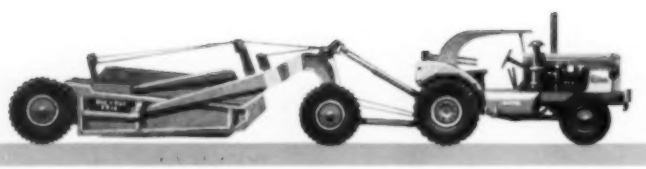


ADAMS motor grader. Adams division of Le Tourneau—Westinghouse offers its model 660 powered by Cummins.

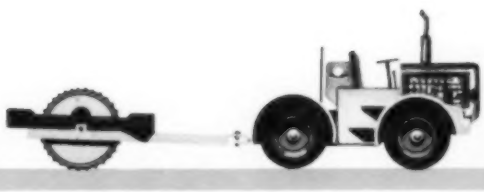
EUCLID loader. This Euclid belt-conveyor can be bought powered by a Cummins Diesel.



GALION model T-700 motor grader. This motor grader is available with a 190 h. p. Cummins as standard power.

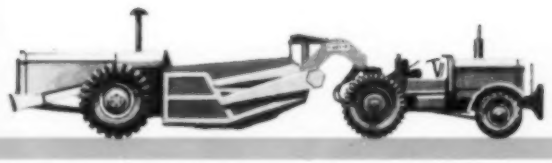


M-R-S four-wheel tractor. This is one of four M-R-S tractors available with Cummins Diesels.



WAGNER 4-wheel drive tractor with sheepsfoot. One of two rubber-tired tractors available Cummins powered.

in these famous-make



EUCLID 18-yard twin-engine scraper. One of three Euclid scrapers you can buy powered by Cummins.

LE TOURNEAU-WESTINGHOUSE "B" Tournapull. Cummins also powers the "C" and a Tournatractor.

WOOLDRIDGE 18-yard "Terra Cobra" scraper. Seven "Terra Cobra" scrapers and dumpers use Cummins power.

TRACTORS
GRADERS
SCRAPERS
LOADERS

Cummins Diesels give you the high torque needed for 'dozing, pushing, loading . . . fast acceleration . . . sustained high speeds on the haul. On mining jobs, you will find Cummins power in the rubber-tired tractors that pull the biggest scrapers—push the biggest 'dozer blades.

Cummins Diesels are now standard in 7 motor graders from 80 to 190 h.p. These machines do your grading and ditching jobs faster, better and more economically.

You now can get Cummins power in crawler tractors, too. Driving through a torque converter, a new 120 h.p. Cummins gives these tractors greater drawbar pull than all other tractors of their class—makes them outpull and outperform most tractors of heavier classifications.

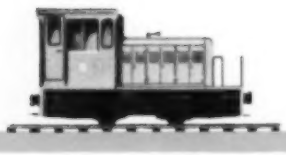
CUMMINS DIESELS

give you the big plus

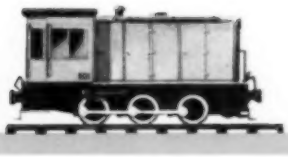
MORE PROFIT

CUMMINS

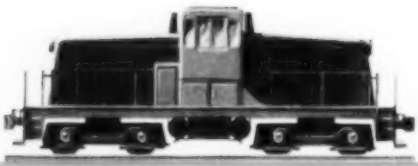
diesels now available



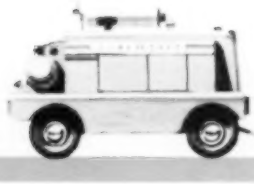
BALDWIN-LIMA-HAMILTON locomotive. One of six switching and mine locomotives available with Cummins power.



DAVENPORT BESLER DAVENPORT industrial switcher. Cummins Diesels are offered in nine Davenport models, from eight to sixty tons.

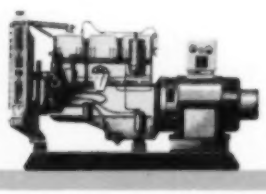


GENERAL ELECTRIC 80-ton industrial locomotive. A standard line of diesel electrics from 25 to 95 tons available Cummins-powered.

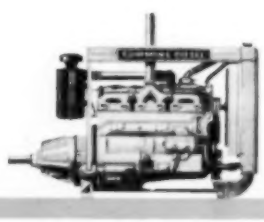


WORTHINGTON "Blue Brute" 315-foot rotary air compressor. Available powered by a Cummins 120 h.p. Diesel engine.

Standardize on Cummins for generators and power units, too!



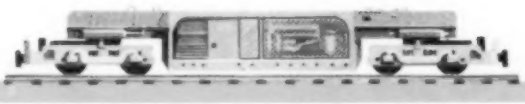
GENERATOR UNITS. Cummins makes lightweight, compact generator units—30 to 250 kw—adaptable to either portable or stationary applications. Simplicity of design minimizes installation expense. The low fuel consumption and small costs of maintaining Cummins Diesels are the reasons why power users have found that Cummins generator units give them the lowest cost per kilowatt hour.



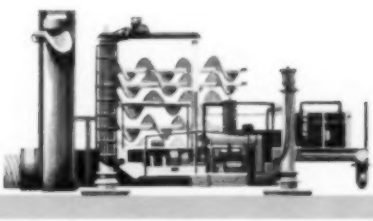
POWER UNITS. Cummins makes a complete line of rugged, heavy-duty industrial engines—60 to 600 h.p.—adaptable to an extremely wide range of applications, both portable and stationary.. These engines can be furnished as straight industrial units (fan to flywheel) . . . as complete power units with radiator cooling, hood, and clutch power take-off . . . or with a wide variety of accessories.

in these famous-make

LOCOMOTIVES
AUGERS
HOISTS
DRILLS



GENERAL ELECTRIC GENERAL ELECTRIC 40-ton underground locomotive. This unit comes powered by a Cummins 600 h.p. Diesel.



COMPTON COMPTON model 28 coal auger. One of five Compton coal augers you can buy powered by Cummins Diesels.

No matter what phase of mining work you specialize in . . . no matter what type of equipment you use most . . . you can be sure of maximum efficiency, *more profit* when you standardize on Cummins Diesels. There's no surer way of increasing production . . . cutting costs.

The mining equipment shown on these pages is only a sample of the wide variety of units available with Cummins power. All incorporate the latest engineering advances to let you do more jobs faster, better, and cheaper.

For further information, contact your Cummins Distributor or your equipment dealer, or mail coupon today.

CUMMINS DISTRIBUTOR
(See address on back cover)

I am interested in finding out more about Cummins Diesel advantages.

☐ Send me, free of charge, your directory of manufacturers offering Cummins Diesels in their equipment.

☐ I want details on repowering my present equipment. Please have your representative call.

Name_____ Position_____

Company_____

Address_____

CUMMINS DIESELS
give you the big plus

MORE PROFIT

Here's what you get

when you standardize on Cummins!

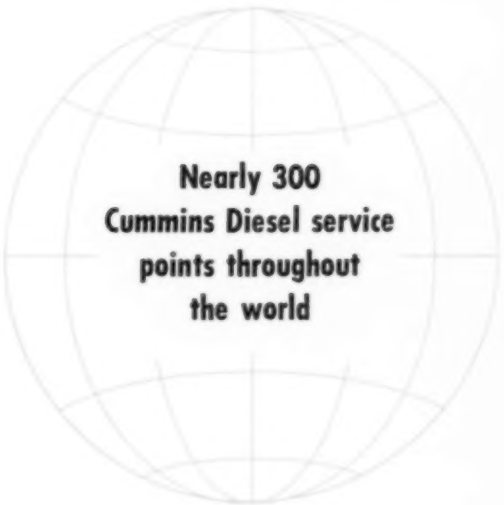
Maximum Equipment Availability — Cummins rugged basic engine design has the proven superiority of the 4-cycle operation. High-strength metals and alloys (Stellite valve seat inserts, on *both* intake and exhaust ports, for example) cut scheduled maintenance and unscheduled downtime to a minimum.

Greater Diesel Economy — Use Cummins Diesels as standard power in your machines . . . and you are assured of maximum fuel and maintenance economy. Over 150 models permit pinpoint matching of power to job.

Cummins PT Fuel System — Cummins exclusive PT fuel system drastically reduces fuel system maintenance costs while permitting the engine to operate at top performance. It is easier to understand and service than any other diesel or gasoline fuel system.

Interchangeability of Parts — Wherever possible, Cummins has standardized internal engine components (bearings, pistons, crankshafts and many other parts). This lets you keep a smaller parts inventory . . . reduces your dollar investment in parts.

Export Service and Parts Help — Cummins worldwide distribution network — devoted to the sales and service of Cummins Diesels — keeps factory-type maintenance and genuine Cummins parts near at hand. Special service and parts availability at job-site is another big plus.



Over 45 famous manufacturers of heavy equipment offer Cummins Diesels as power in over 200 models.

CUMMINS **MORE PROFIT**

gives you the big plus

Printed in U. S. A.

CUMMINS ENGINE COMPANY, INC.

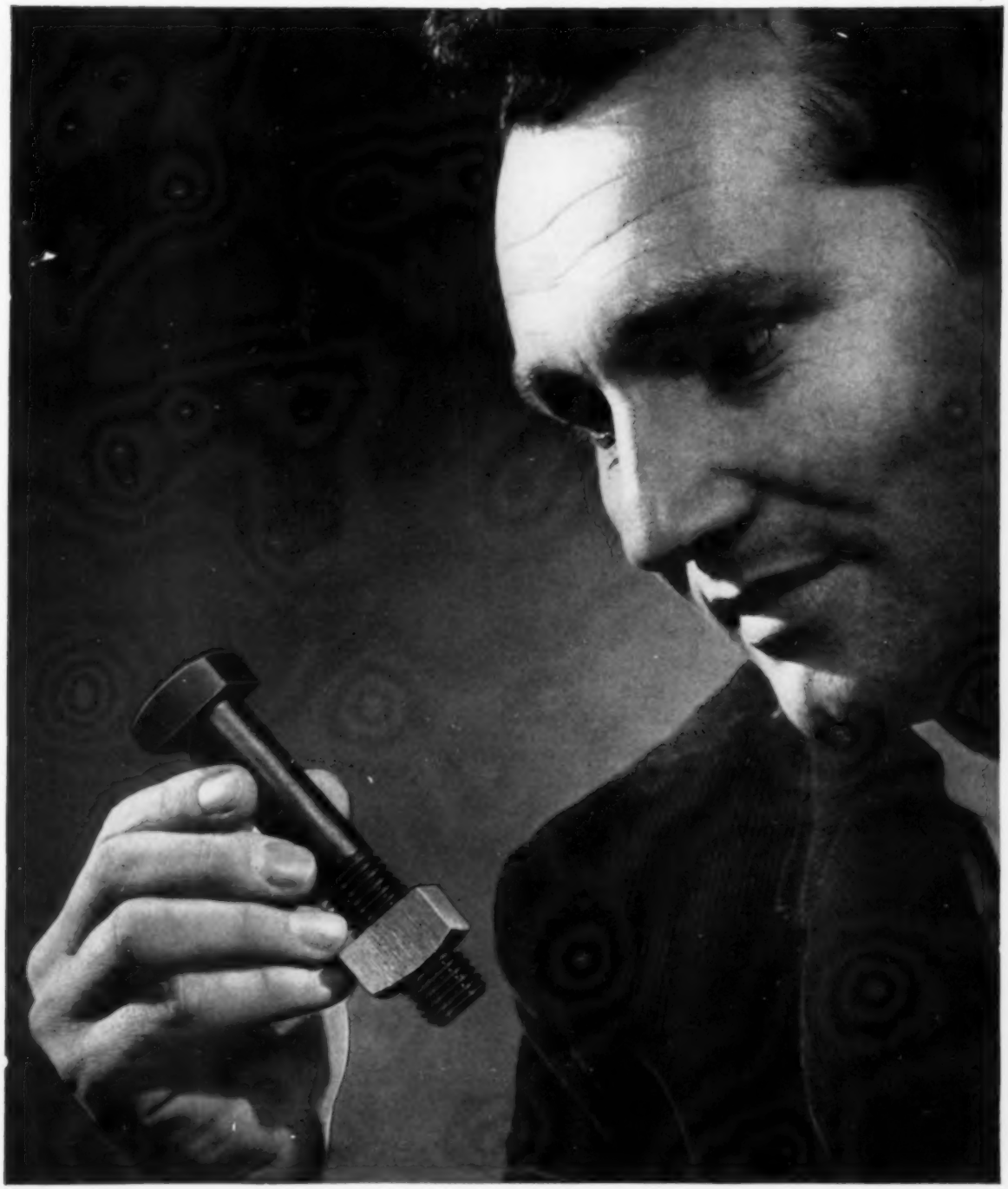
Columbus, Indiana

Export: Cummins Diesel Export Corporation

Columbus, Indiana, U.S.A.

Cable: CUMDIEX

Address _____



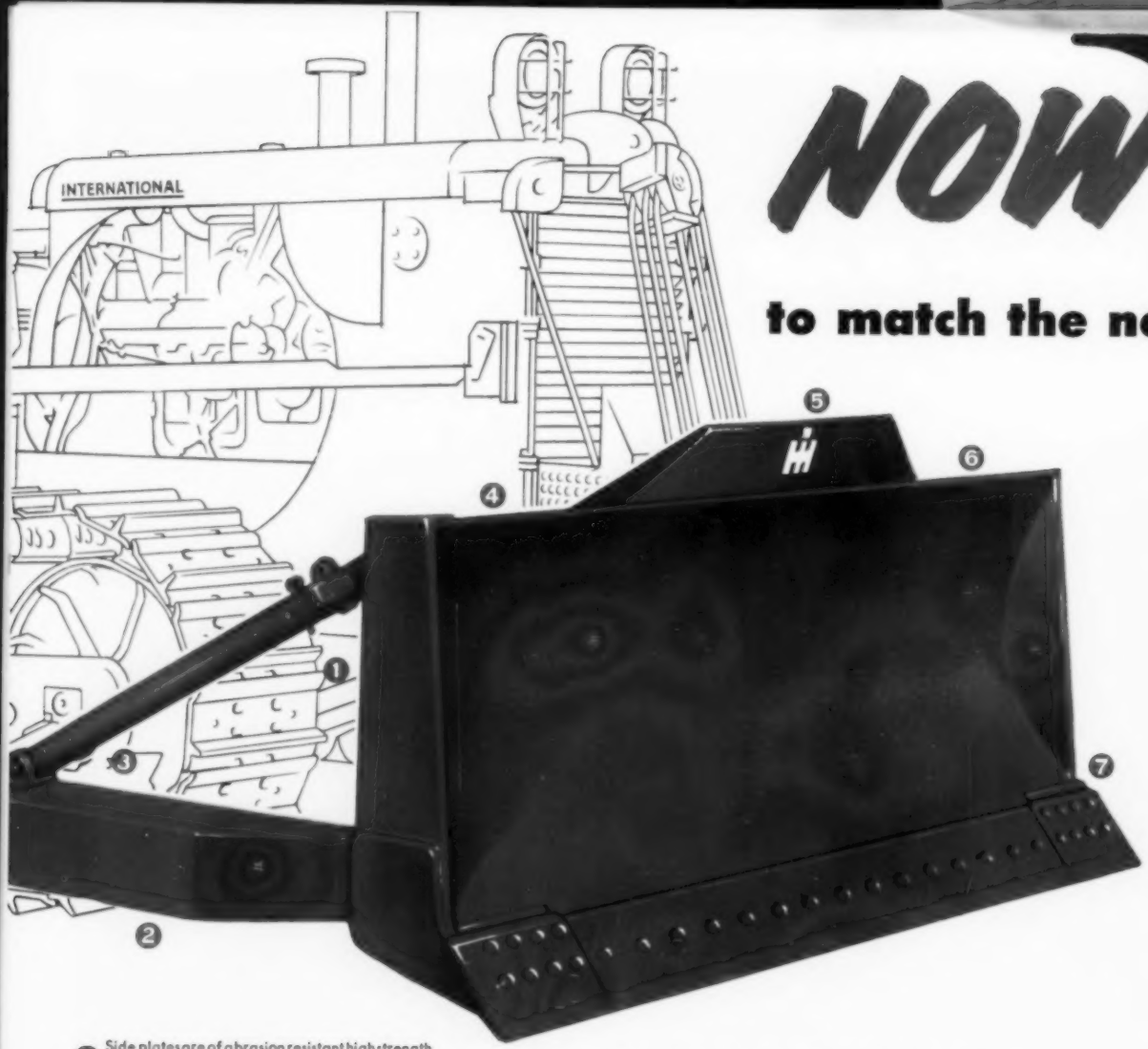
"Bethlehem Machine Bolts have really got it. Strong heads. Well-formed threads. Variety of styles. What more could we ask?"

Spikes and track bolts, too!

BETHLEHEM STEEL

NOW.

to match the new



1. Side plates are of abrasion resistant high strength steel, securely fused to moldboard and box sections by low-hydrogen welding. They prevent load spillage, allow you to carry larger loads. Standard on all International bulldozer blades.

2. Push arms are sturdily constructed of box sections. Side plates are mill-rolled with integral back-up bars to support top and bottom plates. Machine welding guarantees uniformity of weld.

3. Headless pins, locked by eye bolts, secure struts to blade. For removal, pins can be driven out in either direction. On hydraulic blades, all control linkage is connected to the blade through self-aligning bearings.

4. Entire perimeter of blade is backed by heavy box channels solidly fused to moldboard. With this type of construction moldboard, box channels, and welds flex freely to prevent weld failure.

5. Spillboard is wide and high to prevent spillage over top of blade. Note that it is curved to match the contour of the moldboard, thus aiding boiling action. Width of moldboard allows you to carry full load for which the blade was intended.

6. Moldboard is formed from a single sheet of low-alloy, high-strength steel. International blade is shaped to perfect curvature in a special forming machine to assure uniform strength and stress resistance over entire area.

7. Shear bars welded to moldboard support end bits and relieve stress on end bit bolts. Lower edge of end plate is reinforced by wear plate to add strength at corners, increase wear resistance.

New blades designed from "ground" up

To make full use of the greater work capacity of the new Bonus-Powered International crawler tractors, we now offer a complete line of newly designed blades matched to tractor power.

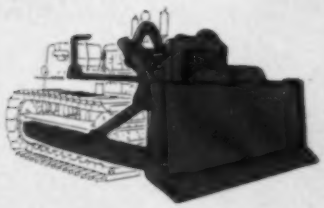
These new blades are rigidly supported around the edges by box sections to give the blade strength but also permit the moldboard to "breathe" under load stresses. New automatic welding processes guarantee that the welds in International blades will hold up under *any kind of job conditions*.

International blades will last far longer and give you far less trouble than any others you have ever hung on any tractor. When you inquire about the new line of Bonus-Powered International crawler tractors, ask your International Industrial Power Distributor for all the facts about the new line of matching blades. See for yourself that they are the best designed, best constructed on the market.

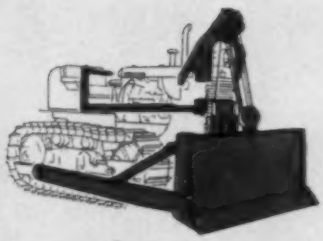
Write For New Blade Literature: An illustrated specification list of the *228* attachments available for International crawler tractors is just off the presses. For your free copy of Mailing Folder CR-492-F, write Consumer Relations Department, International Harvester Company, 180 North Michigan Avenue, Chicago 1, Illinois. No obligation, of course.

..42 new blades

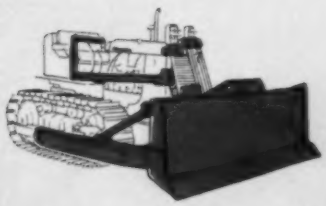
..Bonus-Powered International crawlers



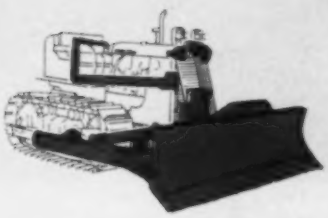
Direct Lift Hydraulic Bulldozer
Operates off front-mounted, gear-driven pump which gives fast blade action. Self-aligning bearings prevent binding of linkage.



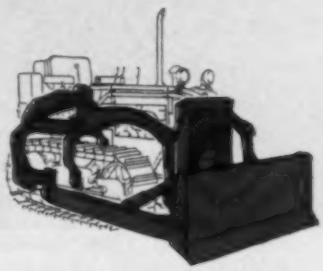
High-Gantry Cable Bulldozer
Operates off either front or rear-mounted International cable control unit. Available for TD-24, TD-18, and TD-14 tractors.



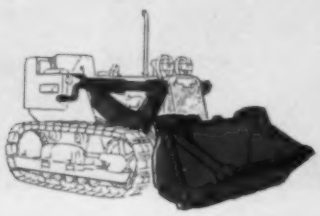
Low-Gantry Cable Bulldozer
Operates off either front or rear-mounted International cable control units. Available for TD-24, TD-18, and TD-14 tractors.



Hydraulic or Cable Bullgrader
Operates off high or low gantry, front or rear cable controls on TD-24, TD-18, and TD-14 tractors. Hydraulic bullgrader also for TD-9, TD-6, and T-6 tractors.



Track Frame Mounted Bulldozer—Distributes the load evenly over the length of the tracks. Available only for TD-9, TD-6, and T-6 tractors. Bullgrader also available.



International Drott "4-in-1"
Newest of International Drott loaders. Combines Skid-Shovel, Bull-clam, clamshell, and bulldozer in one unit. Available for TD-14, TD-9, and TD-6 tractors.

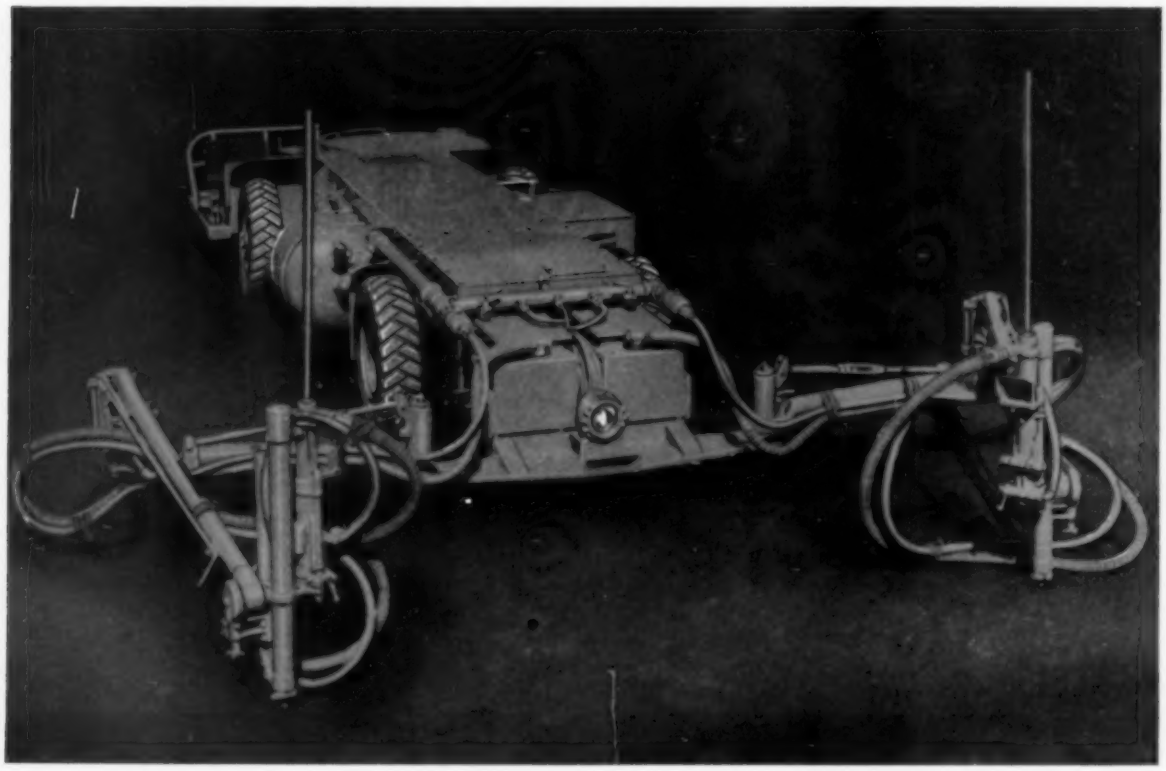
INTERNATIONAL HARVESTER

International Industrial Power

[illegible] W. MICHIGAN AVENUE—CHICAGO 54, ILLINOIS

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-Tired Loaders . . . Diesel and Carbureted Engines

Acme adds 275 Compressor to JUMBOLTER...*for fastest most efficient roofbolting*



SUPER JUMBOLTER NOW AVAILABLE IN ONE COMPACT, SELF CONTAINED UNIT

It's Acme's newest contribution to better, faster, safer mining. Super Jumbolter combines all the advantages of the original Jumbolter plus a 2-stage 275 CFM compressor.

New Super Jumbolter saves time and working space. No need for separate portable compressor —no air lines to get in the way—just move your Super Jumbolter in and start bolting.

Jumbolter stopers put in bolts more than three times as fast as ordinary methods. It can work an area 23' 10" wide from one location. Air-articulated arms reach out 9' in front of machine, swing in a 270° arc. Overall heights from 21" permit bolting any roof from 36" to 9' in height.

The new Jumbolter has a unique built-in dust collection system. It does not remove (or pass) the cuttings through the body of the machine, nor does it use any type of external hood, or dust collection tube. Cuttings are removed through the side of the chuck housing immediately after they leave the drill steel. They are collected from the face through holes in the bit and down through the center of the drill steel.

Write today for new descriptive folder showing the many advantages of Acme's new Super Jumbolter.

ACME Machinery Company

PHONE 2274 WILLIAMSON, WEST VIRGINIA

Speed and Mobility

get more work done!

Tournatractor takes the shortest route to job . . . via highway or cross country . . . cuts hours from job-to-job moves.

208 hp Tournatractor with PCU on rear can be hooked up to pull scrapers, rooters, and rollers.

Rubber tires do not damage rails or ties... unit can switch up to 10 fully-loaded railroad cars at once.

Whenever your application involves scattered job assignments, Tournatractor's 19 mph forward speed and extreme maneuverability cuts moving costs and reduces the non-pay hours of moving time. Big, low-pressure tires let you drive Tournatractor anywhere. For long moves, you save time, bother, and expense of locating a trailer, moving in extra manpower and transport equipment, loading and unloading.

Speed on the job

Tournatractor pulls, dozes, pushes at working speeds 2 to 3 times faster than crawler tractors. You have 3.69 mph in second gear, 8.38 mph in third, compared to crawler speeds of around 2 mph in second, and 3 mph in third. Tournatractor travel speed of 19.23 mph compares to the crawlers' top ranges of 4 to 6 mph. You change gears instantly . . . waste no time shifting.

8 mph reverse speed

High reverse speeds give a very important time-saving advantage to tractor-on-rubber. Nearly 50% of your working cycle on dozing or pushing jobs is usually spent backing up. Tournatractor's reverse speed cuts crawler backing up time by almost 25 to 50%. Crawler highs in reverse range from 3.1 to 6.2 mph. Tournatractor high in reverse is 8 mph.

Instant shifting

Constant-mesh transmission aids high-speed performance by eliminating delays in changing gears . . . saving vital momentum . . . gives you any gear ratio instantly. Tournatractor works in higher gear ratios because there is no loss of momentum for shifting. Torque converter increases this advantage by giving you wide automatic over-lapping of gear ratios, without depending on operator to jockey levers to get the most effective ratio of power and speed to load.

Ample flotation and traction

2' wide tires stay on top of soft ground instead of digging in. Lugs bite into underfooting to give traction. Tire pressures as low as 20 lbs. absorb shock. Rolling action compacts loose materials far more effectively than crawlers.

Lower maintenance

There are 4 easy-rolling-wheel-assemblies as compared to more than 500 wearing parts in standard track-assemblies. This means less maintenance. Dollar-wise this reduction in maintenance time can mean a saving of $3 per hour in operating expenses.

Easier to operate

Fingertip electric controls work at the flick of a switch. Steering, raising and lowering the blade, and operating the power-control-unit are all handled by buttons on dashboard. There are no levers, wheels, or other manual controls to handle. Big, low-pressure tires greatly reduce jars and jolts, stress and strain, on both operator and machine.

Interchangeable equipment

Adding to Tournatractor's versatility are a number of interchangeable attachments . . . Bulldozer, Angledozer, Root Rake, Snow Plow. This versatile tractor can also be equipped with a Push-Block, Logging-Winch or Tree-Pusher for additional applications. Drawbar and PCU are available for hauled equipment. Electric-control, open-top scrapers are also available for use with Tournatractors.

Find out for yourself how Tournatractor's go-anywhere mobility and 19 mph speeds can help you get more work done. Compare this rubber-tired tractor alongside your present crawlers. Write or call for a demonstration.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-926-G-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

New "B" Rear-Dump offers you big capacity PLUS

High speed

B Tournapull Rear-Dump has forward speeds from 2 to 34 mph, plus two reverse speeds, 2 and 4 mph. Wide selection of speeds enable "B" to climb steep grades.

Easy loading

Loading of new "B" is made easier by large "target" area of bowl. Its 17′8″ length, 10′2″ width, and 7′6″ depth make it ideal for any size shovel. Rear of body provides wide, low entry for dipper to give extra speed advantage for the excavator. Big 35-ton capacity can make every load a profitable one.

Fast dumping

At the touch of a dashboard switch, body raises to vertical position. Edge of bowl swings behind and below rear wheels so rocks cannot roll forward to lodge against wheels nor can material pile under rear end.

180° turn in 35′ space

Two wheel prime-mover turns 90° right or left . . . machine in normal use makes non-stop 180° turn in space only 35′ wide. With body in dump position, machine can turn 180° in only 27′. This maneuverability of "B" allows you to work in tight quarters where smaller conventional haulers often cannot go. Jockeying back and forth to get into loading position is eliminated.

7536 square inches of braking surface

Heavy-duty air brakes with 7536 sq. in. of braking surface improve maneuverability . . . add to operator confidence for faster operation on steep grades and narrow winding haul roads.

New "B" also offers these additional features

- Big 7-ft. high 2-ft. wide low pressure tires for better flotation.
- Rugged body construction for longer equipment life.
- Simple, positive electric controls for fast, easy operating.
- Lower maintenance because there are no hydraulics, no long driveshafts, no springs or spring hangers.

For more information on this big new "B" Rear-Dump see your LeTourneau-Westinghouse Distributor.

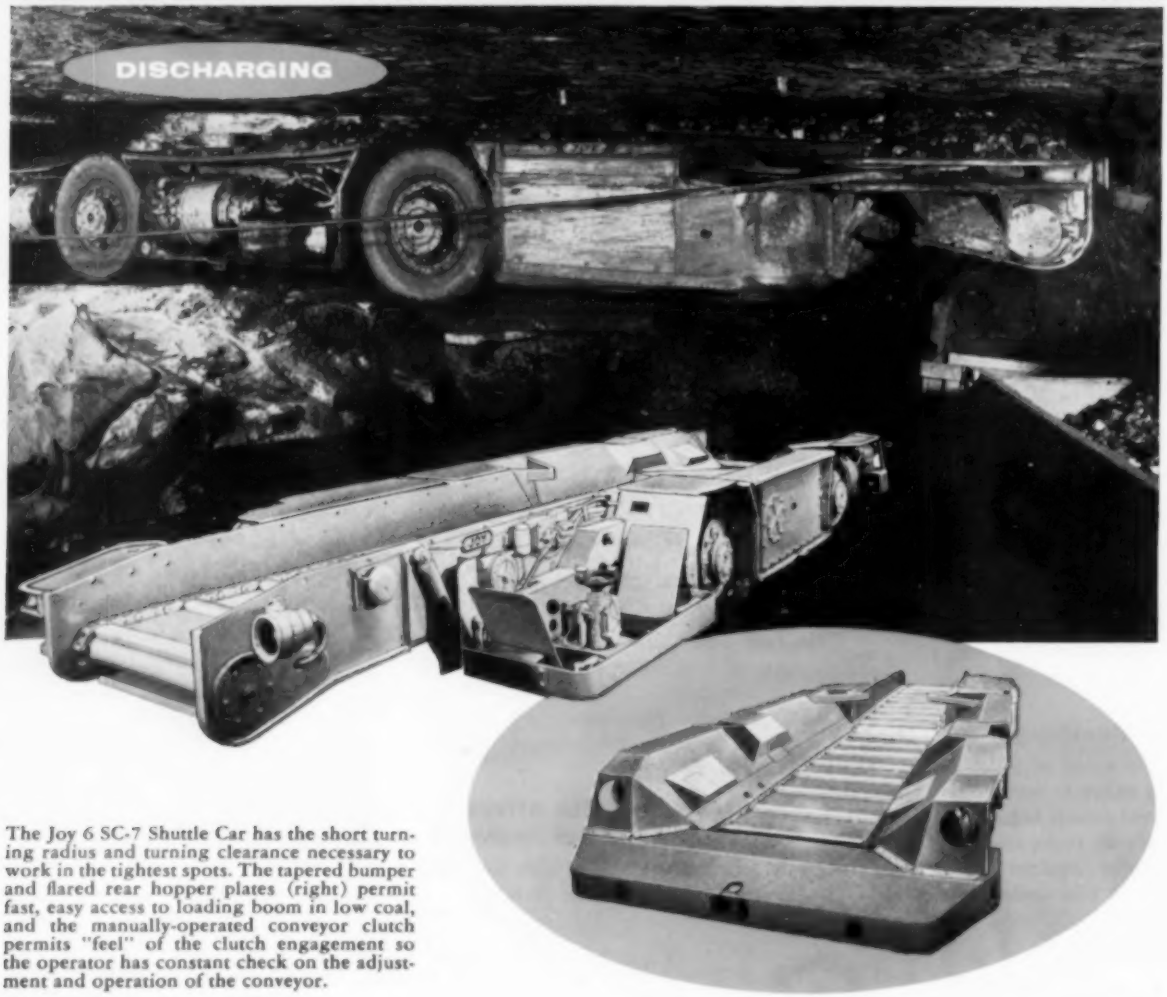
Tournapull — Trademark Reg. U. S. Pat. Off. BR-888-G-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

LOOK HOW WE'VE IMPROVED THE



The Joy 6 SC-7 Shuttle Car has the short turning radius and turning clearance necessary to work in the tightest spots. The tapered bumper and flared rear hopper plates (right) permit fast, easy access to loading boom in low coal, and the manually-operated conveyor clutch permits "feel" of the clutch engagement so the operator has constant check on the adjustment and operation of the conveyor.

6-SC SHUTTLE CAR!

★HEAVIER WHEEL UNITS! ★EASIER STEERING! ★POSITIVE DRIVE (NO DIFFERENTIALS)! ★MORE RUGGED FRAME—BETTER IN EVERY WAY!

***HUSKY*—TO STAY ON THE JOB**

Here's Joy's latest answer to heavy-duty, efficient haulage in low seams: the great new 6 SC-7 Shuttle Car! Wheel units are stronger, and the beefed-up frame of the 6 SC-7 has a half-inch thick plate reinforcement at the conveyor hinge section, a boxed-in tapered rear, and a heavier bumper for maximum strength. New induction-hardened worm and worm gear—the latter a steel hub welded to a bronze rim—are 50% stronger than former all-bronze gears.

***EASY-TO-STEER* MANEUVERABILITY**

Four-wheel hydraulically-powered steering makes the 6 SC-7 ideal for sharp turns in close-timbered, narrow headings . . . permits exact positioning of the car under the loader for maximum output and minimum spillage. A new twin-lever type of cam-and-lever steering gear, plus simplified linkage, provide faster-acting power steering and easier handling under all conditions.

***POSITIVE* POWER**

Four-wheel positive traction drive—*with no mechanical differentials*—provides the balanced "no-spin" tractive effort you especially need on soft or irregular bottoms. Two 7½ HP heavy-duty traction motors and one 7½ HP heavy-duty pump conveyor motor assure reserve power for most requirements. Special 10 HP motors are also available where extra power and faster speeds are desired.

***FAST* TRAMMING**

The 6 SC-7 trams a 2½-ton load (3¼ tons with 4″ sideboards) at 3.7 mph, discharges in less than 35 seconds and trams back empty at 4.2 mph. With special 10 HP motors the car trams at 3.9 mph loaded, 4.7 mph empty, and discharges in 29 seconds . . . can make a complete trip from face to discharge point and back again in just a couple minutes.

***LOW . . . EFFICIENT* TO OPERATE**

This new, improved 6 SC-7 is only 29″ high without 4″ sideboards (other models available in heights up to 38½″ without sideboards). Wide operator's platform assures comfort and protection. Low rear, only 15¾″, assists loading under low roof, and the discharge conveyor is designed to permit maximum raising. The operator always uses right foot on the brake and left foot on traction.

EASILY MAINTAINED

Drive units, shafts, disc brakes, controls, etc. of the 6 SC-7 are all readily accessible. Wheel drive unit assemblies can be used in any position on the car, reducing stock problems and speeding change-overs. The simplified steering linkage has only half as many parts as formerly. Control switches above operator's platform are out of reach of dirt and water damage, and the front end cable reel mounting and large sheave-wheel guide protect the cable for maximum life.

That's only a part of the benefits built into the great 6 SC-7 Shuttle Car. Let us give you a full rundown on it . . . or any other unit in the complete Joy line of underground mining equipment, built and *field-proved* to give you the world's best job of cutting costs and increasing tonnage. ● *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 95-1

Consult a Joy Engineer

WSW CL 6131-95

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

Get Lubricants matched to Modern

MODERN MINING

...from seam to stockpile

1. **PERMATREAT**—the coal spray that lasts the life of the coal to improve BTU value, cut windage loss. Freeze-proof and dust-proof.

2. **ASHLAND BENTEX GREASE #2 — MULTIPLE-PURPOSE GREASE**— the new soapless grease with the highest melting point of any grease for anti-friction and plain bearings, insoluble in water, serviceable under the most extreme temperature conditions.

3. **ASHLAND GENERAL PURPOSE OIL** — the all-purpose oil for the Continuous Miner, loaders or shuttle cars. Works equally well in hydraulics and transmissions.

4. **ASHLAND TOPFLITE SUPER HD — DIESEL ENGINE OIL S-1** — for stationary or mobile diesel engines under any load or condition. Meets all government specifications.

Ashland
PERMATREAT
COAL SPRAY
seals in dust

Mining . . .

ASHLAND OIL & REFINING COMPANY

Ashland, Kentucky

KOEHRING COMPANY Milwaukee 16, Wis. Subsidiaries: JOHNSON PARSONS · KWIK-MIX

Measure excavators by
price per pound of lift capacity

In analyzing shovel operation, you will find that price per pound of lifting capacity on crane rating is also an excellent measurement of excavator value.

Remember, lift capacity is *work capacity*. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength, extra speed and stability to handle bigger loads faster with every excavator attachment.

Check Koehring lift ratings shown below — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

Compare for yourself:

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAP.*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

KOEHRING HEAVY DUTY

*Figures available on request—ask your Koehring distributor to see them.

Du Pont "Nitramite"® provides high strength at low cost in Pennsylvania stripping

MS "PRIMACORD" CONNECTORS ALSO USED TO INCREASE FRAGMENTATION, REDUCE BACKBREAK

1. **BANK** at Jacksonville stripping of the R & P Coal Company is composed of 42 feet of sandstone and shale. Average thickness of the underlying coal seam is 48 inches.

2. **SHOT** consists of 44 holes, arranged in two rows and loaded with 9,300 lbs. of Du Pont "Nitramite" (5 x 24). Hookups are made with Du Pont MS-9 "Primacord" Connectors.

3. **AFTER BLAST,** 15-yard shovel scoops up the well-broken overburden. "Nitramite" supplied the power for this typical blast at an attractively low cost. Excellent fragmentation and minimized backbreak result from use of MS Connectors.

Safety is another reason why "Nitramite" is favored in strippings. Friction, shock, rifle bullets won't cause explosion. "Nitramite" is detonated by a special insensitive primer, which must be initiated with "Primacord." Another plus: the easily handled "Nitramite" container is water-resistant . . . can be loaded up to eight hours before shooting. And use of MS Connectors keeps caps off job until firing time! For further information, speak to your Du Pont representative, or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT
BLASTING AGENTS
Products of Du Pont Explosives Research

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

FACING A TOUGH PROPOSITION?

you can beat it with *JALLOY*

Only a seasoned hunter with the right equipment can stand up to a charging rhino. And, likewise, only a special steel like JALLOY can withstand severe impact and abrasion . . . day after day. In comparison with mild steels as well as other abrasion-resistant steels, JALLOY gives outstanding results when heat-treated to your specifications.

This modern heat-treated plate brings savings in steel costs, maintenance, and repair, and also is easily welded. JALLOY is available in three grades, each of which is designed for specific applications.

Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

Jalloy Plates outlast other steels by margins of 4 to 1

Jalloy lowers maintenance costs on ore and coal conveyors

Jalloy provides longer wear with less repair in truck bodies

Jalloy Aprons in Tyrock screen last 3 times as long as other steels

Jalloy heat-treated steel plate beats wear due to impact and abrasion

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 411, Pittsburgh 30, Pa.

☐ Please mail complete data concerning Jalloy.
☐ Please have your representative call.

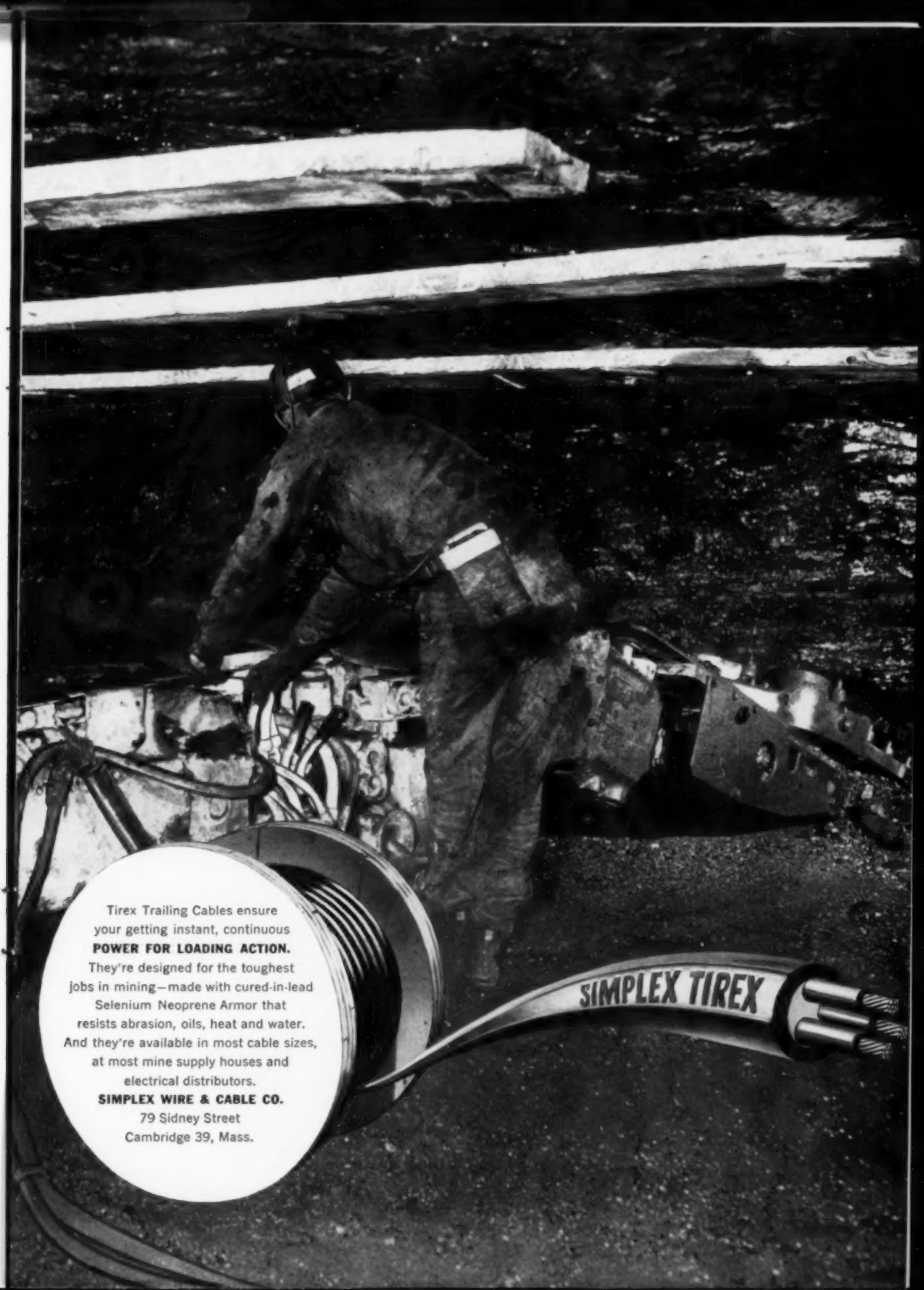
Name _____

Title _____

Company _____

Address _____

City _____ Zone ____ State _____

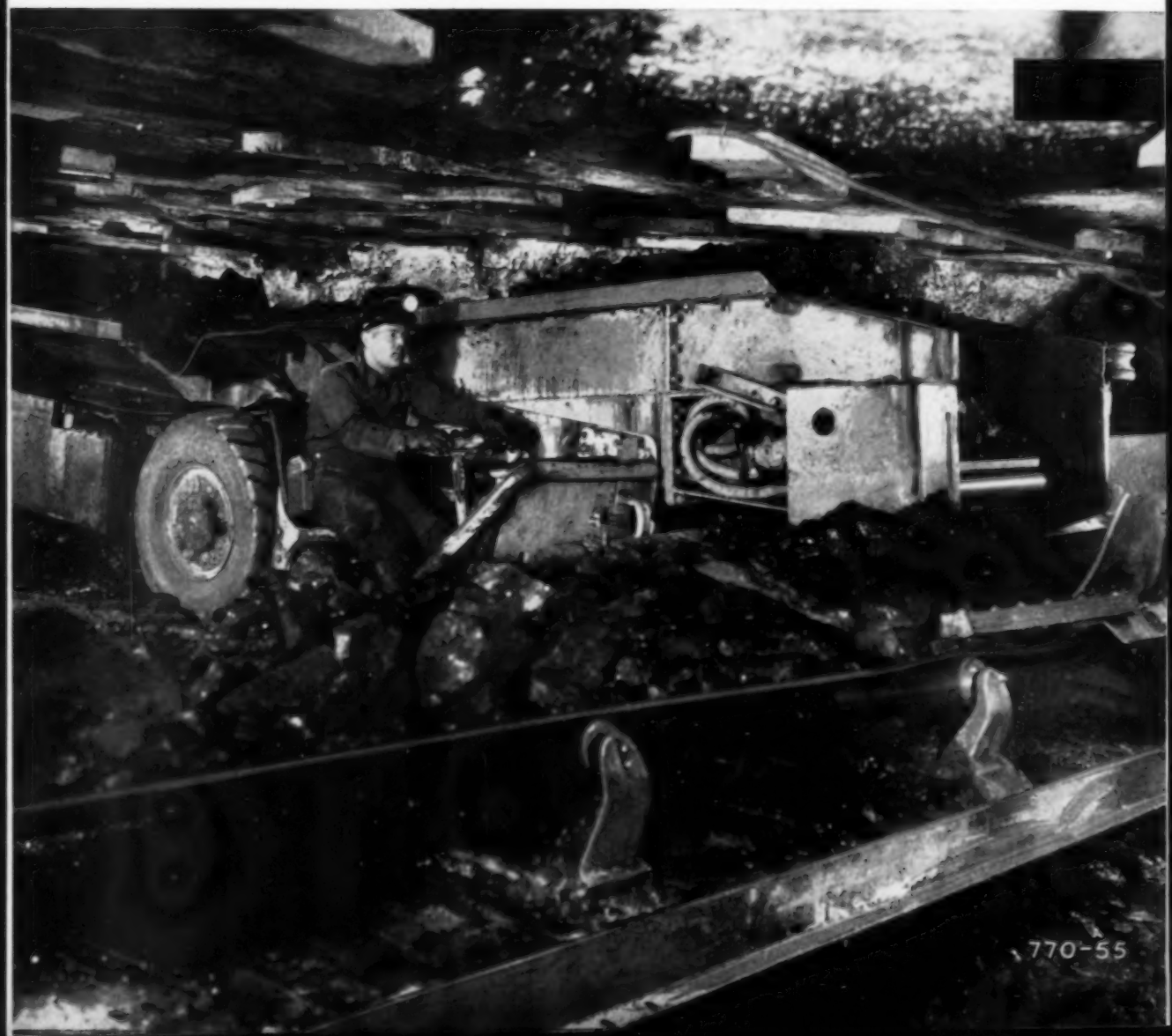


Tirex Trailing Cables ensure your getting instant, continuous **POWER FOR LOADING ACTION.** They're designed for the toughest jobs in mining—made with cured-in-lead Selenium Neoprene Armor that resists abrasion, oils, heat and water. And they're available in most cable sizes, at most mine supply houses and electrical distributors.

SIMPLEX WIRE & CABLE CO.
79 Sidney Street
Cambridge 39, Mass.

team up **JEFFREY SHUTTLE CARS**
and **JEFFREY BELT CONVEYORS**
for speedy, low cost coal transportation

A Jeffrey Class 66 shuttle car discharges coal directly into a Jeffrey 80-A belt conveyor at a large Kentucky mine.



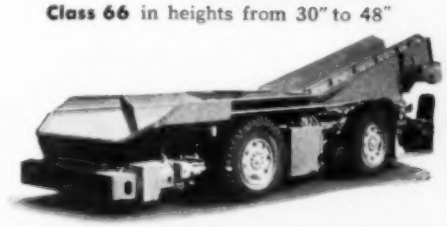
Choose from these three classes of JEFFREY SHUTTLE CARS to match your mining height

They carry big payloads and haul the coal away *fast*. 4-wheel drive, 4-wheel steering and 4-wheel braking make them safe and easy to maneuver under every mining condition. All have hydraulically driven conveyor and cable reel. Conveyor can be run slow for "jogging" when loading, slow or fast when unloading, and its direction can be reversed.

Jeffrey shuttle cars are built for continuous, rugged service.

Class 68 in heights from 24" to 32"

Class 66 in heights from 30" to 48"



Class 67 in heights from 48" to 60"
Class 90 in heights from 44" to 56"

...and BELT CONVEYORS to meet your exact requirements from the complete Jeffrey line

Three types of head sections can be combined with three types of frames, giving you nine combinations to meet any belt conveyor requirement. Jeffrey engineers will help you select the right combination for each gathering, slope or main line haulage job.

These three husky head sections can transmit from 25 to 160 HP for belt speeds from 150 to 600 FPM. Tandem drive puts the conveyor belt in maximum contact with two gear-meshed drive pulleys for most efficient use of power on a long pull.

The three frames are built for belt widths from 26" to 36", and idler roll sizes range from $2\frac{9}{16}$" to 6" dia.

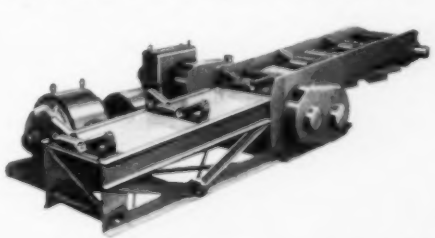
With Jeffrey shuttle cars and belt conveyors, you are assured of high-tonnage handling at low cost, less downtime and low maintenance.

The Jeffrey Manufacturing Company Columbus 16, Ohio

JEFFREY

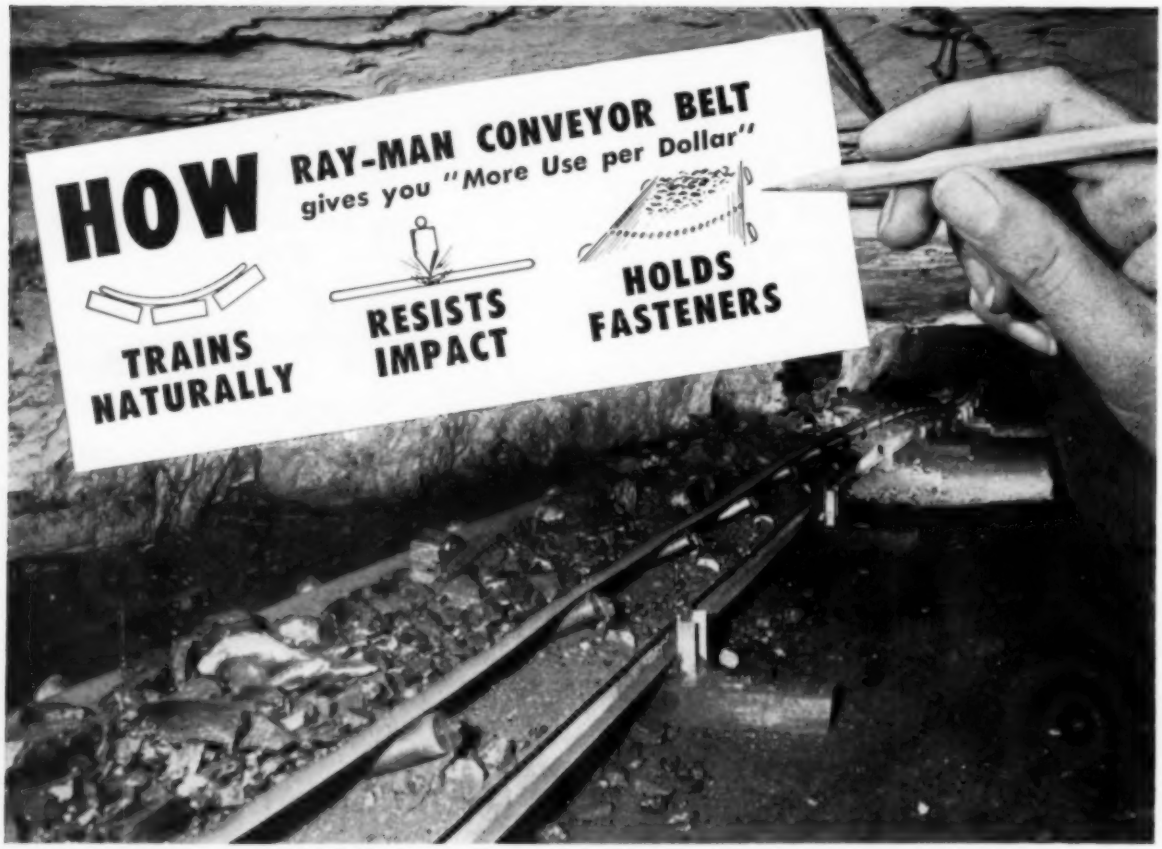
MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

52-B Head Section for 25 to 75 HP motors. 52-B frames are made for 26", 30", and 36" belts, and $2\frac{9}{16}$" or 4" diameter idler rolls.



64-A Head Section for motors up to 125 HP. 64-A frames are made for 30" and 36" belts, with 4" diameter idler rolls.

80-A Head Section for motor drives up to 160 HP. The 80-A frame is adaptable to 30" and 36" belts, and 4", 5" or 6" dia. idler rolls.



This Heavy Duty Coal Belt Cuts Cost in Tough Hauls!

Ray-Man Conveyor Belt is engineered to stand up where ordinary belts tear, puncture, or experience fastener pull out. Elastic cushioned strength member plies made from strong, natural and synthetic fabric give this belt resilience to the impact of shock loading flexibility to trough easily and train naturally. Compensated, balanced construction relieves outer ply stress, prolongs belt life. Ray-Man requires no breaker strip and offers exceptional fastener holding ability under extreme conditions of use. Ray-Man Conveyor Belt cuts handling costs because it does a better job . . . and *it lasts longer.*

Like all Manhattan heavy duty conveyor belts, Ray-Man is mildew-proof and moisture resistant. R/M's exclusive "XDC" Cover protects the belt against wear, tear, cuts and abrasion to a degree never before attained.

For unusually abusive shock loading, R/M's extra-cushioned Homocord Conveyor Belt may be better suited for your job. An R/M representative will help you compare the advantages of all R/M Conveyor Belts to determine the one that will cut your handling costs most . . . give you "More Use per Dollar" in your operations. Contact him today . . . or write for Bulletin 6906 and 6915.

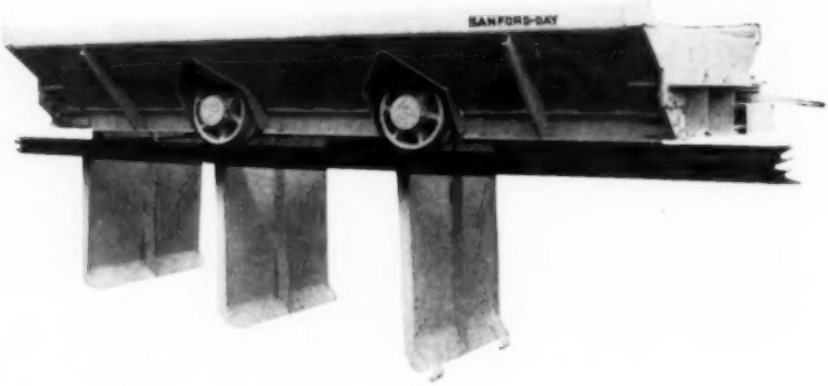
RM 601C

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

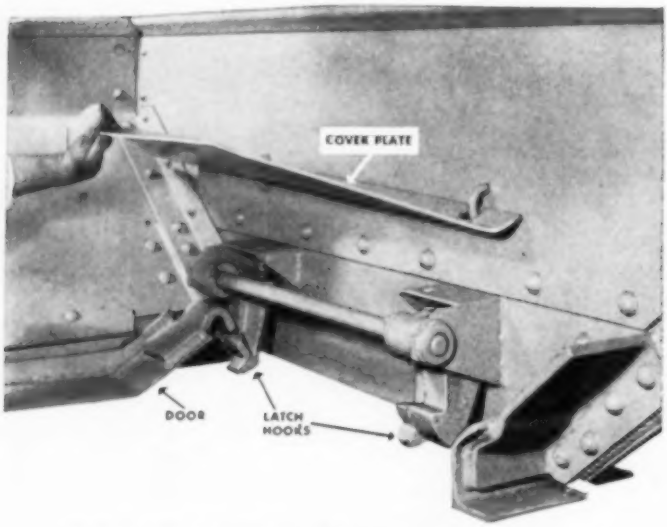
. . . You Get THREE Important



1...

You haul up to 1,000 lbs. more per car with S-D Automatics!

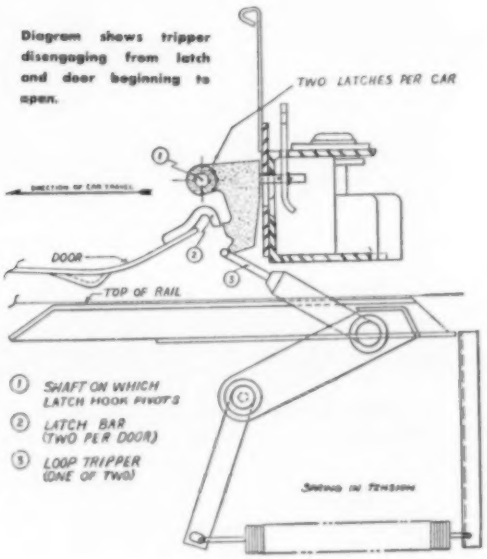
ONE-QUARTER to ½ ton more capacity per car for the same overall dimensions is available only in S-D Automatics because of the construction features of Sanford-Day's exclusive bottom dumping car design. If you were buying, for example, 16 bottom dumping cars of any other make with a 4-ton level full capacity, you would need only 14 S-D Automatics of the same overall dimensions to haul the same tonnage. You would save two cars in every 16 . . . 12½ percent in original investment . . . 12½ percent in maintenance . . . 12½ percent less dead weight to haul. Any one of our sales engineers will demonstrate to your complete satisfaction just how we are able to give you this extra capacity.



● S-D AUTOMATIC car doors open only when exclusive "Twin Safety Latches" are tripped simultaneously. The simultaneous unlatching can be accomplished only by the independently operated pair of tripping devices mounted between rails. They act as two padlocks preventing doors opening accidentally anywhere along the haulage route. Cutaway view at right shows the "Twin Safety Latches" with cover plate raised. Drawing illustrates how each tripping device between the rails unlocks the doors while the trip is moving over the bin.

2...

Only S-D Automatics have "Twin Safety Latches" for Safe and Sure Latching

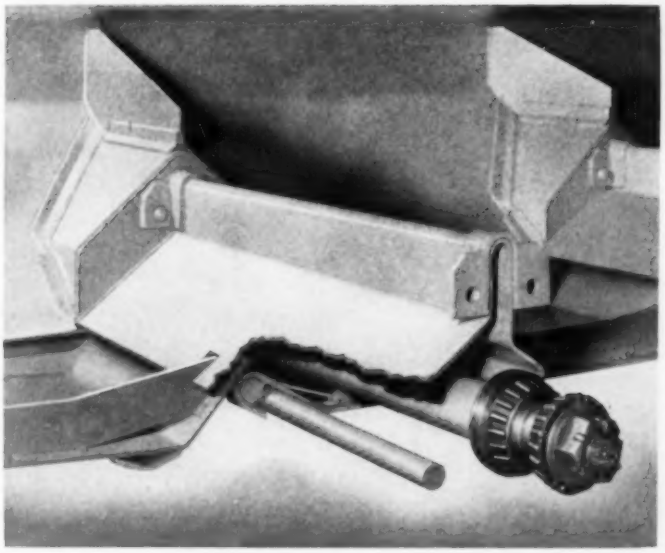


Advantages with S-D "Automatics"

3...

Only S-D Automatics are Safety-Sealed against Dust Leakage

THIS MEANS TWO EXTRA VALUES: (1) Sealed S-D Automatics give you a new, safer in-the-mine operation by eliminating leakage of dust. (2) Sealed S-D Automatics enable you to make a tremendous reduction in track clean-up costs. Photograph at right of a cross section view of the inside of a Sealed S-D Automatic shows you why dust cannot shake down and out through the clearance space between doors and frame.



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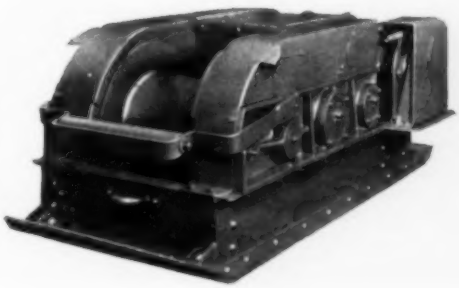

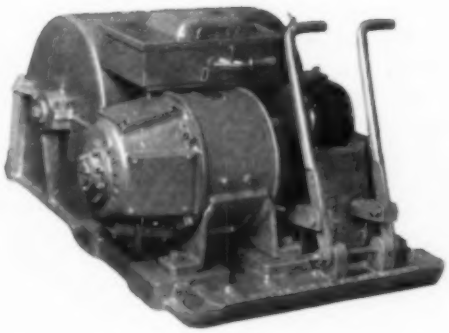

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Bigger COAL Profits!

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Faster, more efficient than end loaders, shovels or clamshell cranes, the Athey 125 HiLoader gives you greatest production at lowest cost per yard. Patented, full-floating feeder digs steadily into coal or other material stockpiles, keeping the fast-moving belt heaped at all times. Swiveling conveyor, hydraulically operated from operator's seat, loads trucks at left, right or behind . . . saves spotting time, cuts delays. Loads 10 cubic yards of materials per minute. Hydraulically operated moldboard cleans the stockpile to the floor. Write today for information.

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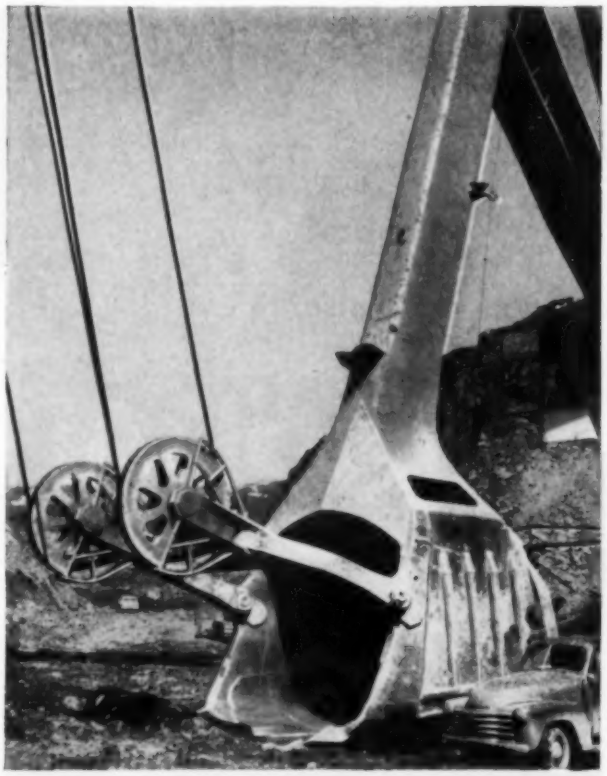
This shovel is so

It scoops up 90 tons of overburden in one bite

THE MOUNTAINEER, "world's largest shovel," built by Marion Power Shovel Company for Hanna Coal Company Division of Pittsburgh Consolidation Coal Company.

CHAMPION WEIGHT LIFTERS. It takes only two 2½-inch Tiger Brand hoist ropes to transform the power of this huge machine into useful work. The boom is supported by four 3⅝-inch Tiger Brand Bridge Strands.

big you can't believe your eyes



THE BIG DIPPER can scoop up 60 cubic yards of overburden, deposit it 290 feet away in piles 100 feet high. Tiger Brand Wire Rope provides the steel "muscles" that make it work.

You have to look at this shovel with your imagination—for your eyes will surely deceive you. The tip of the boom, for example, rises up as high as a 16-story building. The shovel has the power to lift a platform containing 166 1½-ton automobiles 100 feet into the air, swing them the length of a football field, set them down on top of a 10-story building, and swing back for another load . . . all this in 45 seconds!

The tremendous power of the shovel is transmitted to the dipper through two 2½-inch American Tiger Brand Wire Ropes, each 580 feet long. The huge boom, which towers 160 feet, is supported by four 115-foot lengths of 3⅝-inch diameter Tiger Brand Galvanized Bridge Strand. Each strand has a breaking strength of approximately 800 tons, for a total of 3200 tons.

In addition to the main hoist ropes and boom supports, the three-man elevator shuttles up and down on standard Tiger Brand Elevator Wire Rope.

The fact that all of the wire rope applications on this "world's largest shovel" are being handled by standard Tiger Brand constructions emphasizes the quality of the engineering that goes into the complete line of Tiger Brand Wire Rope. No matter how big and exacting the job, you can get a Tiger Brand Rope to fit your needs.

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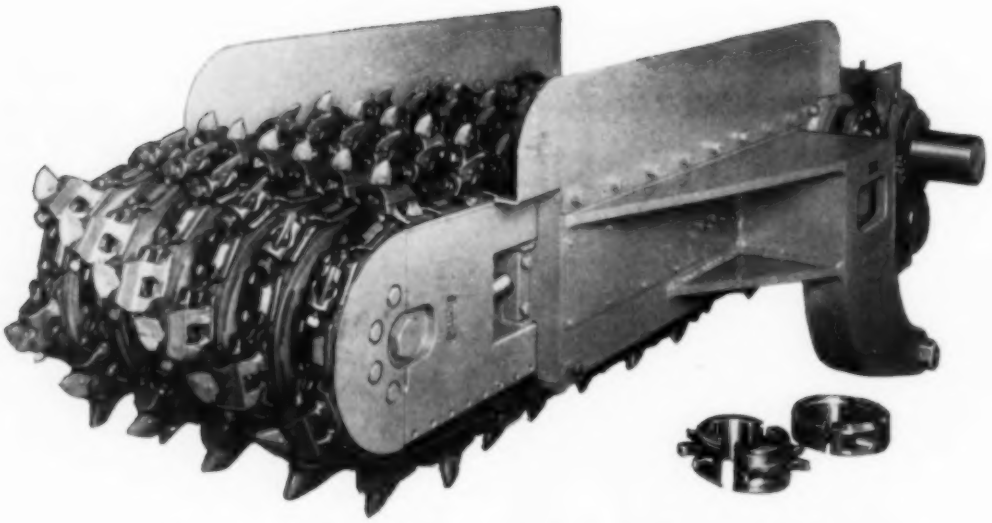

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6-IN-ROW RIPPER HEAD

. . . incorporating Bowdil Carbide Bits.

POINTS OF ADVANTAGE:

1. The Bowdil Fabri-Forged Chains, with their great strength and flexibility. The strongest chain for its size in the field.

2. The Bowdil Ripper Head utilizes 6 renewable, independently adjusted Cutterbars, making it possible to retain equal tension in all 6 chains, regardless of their length or age, within liberal limits.

3. Special hard-surfaced wearing shoes in heads of Cutterbars eliminating maintenance on roller and bearings as formerly used.

4. All 6 chains are similar in kerf and lacing arrangement for interchangeability.

5. The chains may be run with or without renewable liners in the Cutterbars as desired.

6. Included in the Ripper Head assembly is a special improved design head drive shaft and sprocket assembly, which makes it possible to renew a sprocket in minutes without removing the shaft—(two-piece sprockets are used, held on the double keyed shaft by means of special designed resilient clamping collars, maintaining extreme tension to the shaft).

7. All 6 sprockets are interchangeable.

8. The rear of the Ripper Head frame is arranged with circular shock seats for the drive assembly which normally clears the drive assembly approximately 1/16" to guard against extreme flexing of the drive shaft at overloads. This avoids breaking the shaft.

9. The Ripper Head is complete—nothing else needed from the gear boxes out.

Manufactured by

The **BOWDIL** Company
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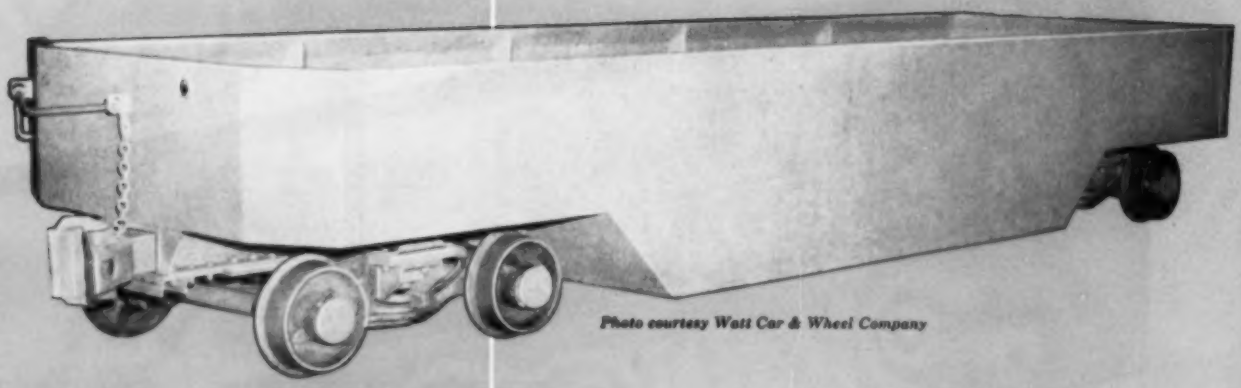


Photo courtesy Watt Car & Wheel Company

Barnes and Tucker Company continues to specify

NATIONAL

equipment for all 8-wheel mine cars

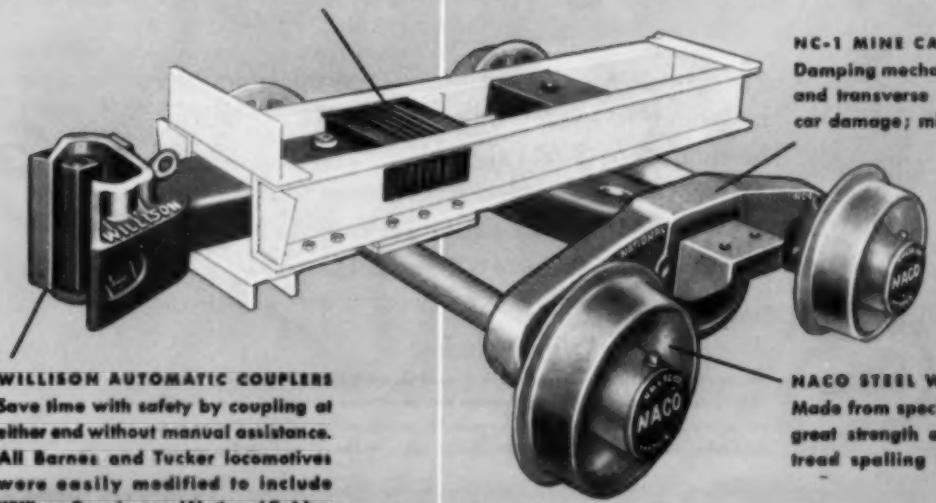
On its latest order for 100 eight-wheel Watt mine cars, Barnes and Tucker Company's Lancashire No. 15 Mine specified National equipment *throughout*. This includes National NC-1 trucks, Naco Steel Wheels, Willison Automatic Couplers, and National Rubber Cushioning devices.

This latest re-order makes—*and keeps* —the entire fleet of rotary-dump cars *100 percent National equipped*. And this means that the Barnes and Tucker Mine has one of the most modern fleets of mine cars in existence. *Modern* because the cars are safe to operate at high speeds... *modern* because they are efficient and minimize spillage... *modern* because they will continue to keep maintenance costs low.

Think of tomorrow today...
and modernize your cars the National way.

NATIONAL
MALLEABLE and STEEL CASTINGS COMPANY
Cleveland 6, Ohio

NATIONAL MI-230
All National Rubber Cushioning devices provide soft initial action, high absorption, and maximum protection.



NC-1 MINE CAR TRUCK
Damping mechanism controls vertical and transverse oscillations; reduces car damage; minimizes spillage.

WILLISON AUTOMATIC COUPLERS
Save time with safety by coupling at either end without manual assistance. All Barnes and Tucker locomotives were easily modified to include Willison Couplers and National Rubber Cushioning devices.

NACO STEEL WHEELS
Made from special Naco cast steel of great strength and ductility; reduce tread spalling or flange breakage.

NEW FROM ROME

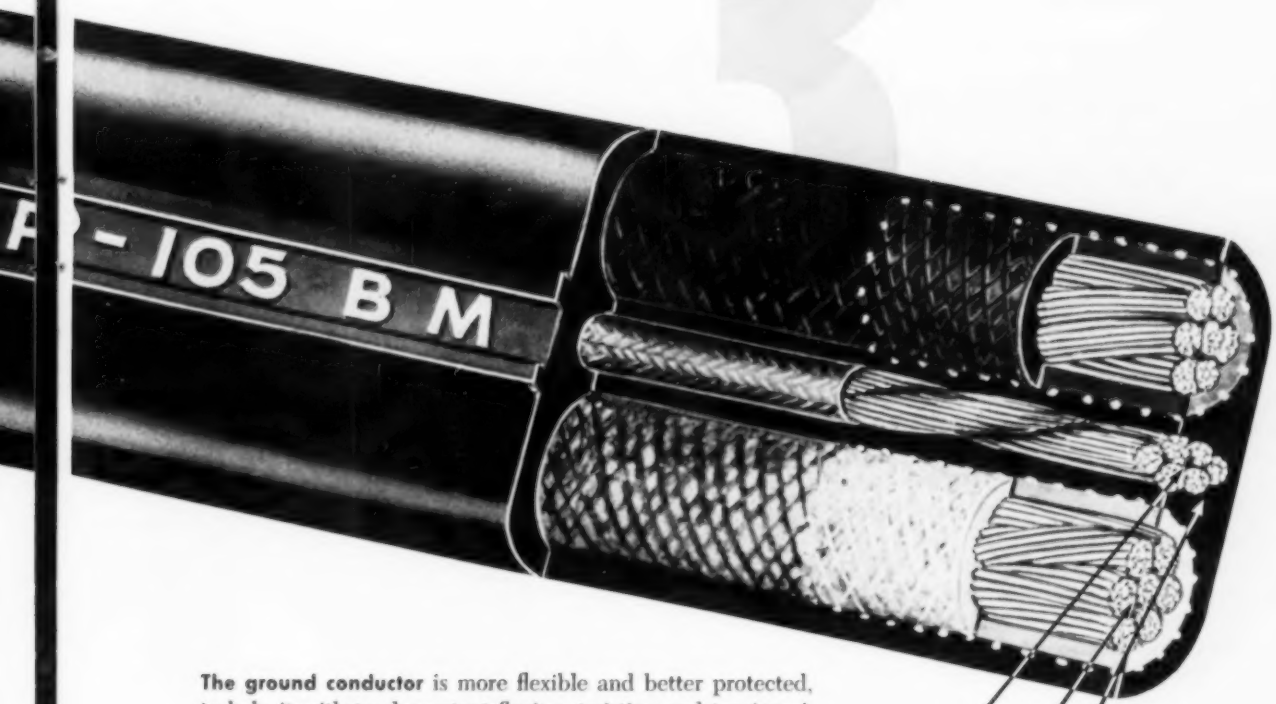
A shuttle car cable with ❸ major design improvements

Perhaps you're one of the many mine operators who have objected—with good reason—to the troubles inherent in Type G flat twin cables.

If so, you'll understand our enthusiasm in announcing a design that cuts shuttle car cable failures to a new low. It's new Rome 60® Parallel Duplex.

The Rome 60® line includes:

Single-conductor locomotive cables • Concentric mining machine cables • Flat twin (parallel duplex) mining machine cables—Types W and G • Type SO portable cords • Multiple-conductor portable power cables—Types W and G • Shot firing cord • Mine power distribution cable • Shovel and dredge cables.

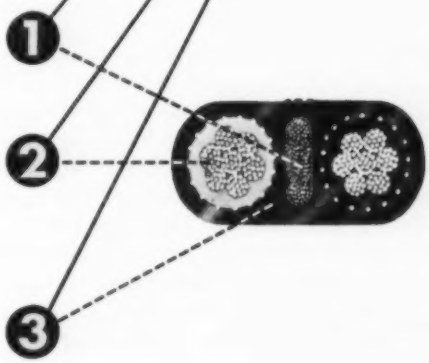


The ground conductor is more flexible and better protected, to help it withstand constant flexing, twisting and tension. A closely woven fibrous covering encompasses the conductor, minimizing the mechanical working of the individual fine wire strands when the cable is flexed and under tension.

The power conductors have new flexibility, too. A greater number of finer strands makes them supple, hence less subject to damage from day-long twisting and bending.

The rugged Neoprene sheath forms a resilient web between the insulated power conductors and the ground, to provide maximum impact resistance and protection against "shorts." Web and sheath are actually an integral unit which binds the entire cable securely together. There's no braid to break when the going gets rough. The sheath cannot separate from the conductor regardless of the amount of twisting and flexing you give it.

Here's a workhorse of a cable—ready to take whatever your operation dishes out. Rome 60 Parallel Duplex shuttle car cable. Get full particulars from your Rome representative. Or write us direct.



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He's laying the main (trunk) line of Primacord to connect all holes in a hook-up which will permit relief of burden — develop better fragmentation with less secondary blasting. Holes have been loaded and tamped. A "down" line of Primacord extends from top to bottom of each hole, in contact with all explosives in the load, detonating directly or initiating a primer — depending upon the type of explosive used.

When the trunk line has been laid, he'll cut it from the spool — then connect each "down" line at right angles to the trunk line with the simple half-hitch which has been found most effective for the type of Primacord used in the holes.

When all is ready for the blast, he'll prepare his fuse and cap (or use an electric blasting cap) and tape this cap onto the firing end of his Primacord hook-up.

Primacord is an insensitive detonating fuse. It cannot be set off by fire, friction or ordinary shock, but must be detonated. It is not affected by stray currents, and even a direct hit by lightning failed to detonate it.

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Primacord • Quarrycord • Ignitacord® • Safety Fuse
Blasting Accessories • Established 1836

PRIMACORD®

The Proved and Approved DETONATING FUSE

P-1

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

MAY, 1956

IVAN A. GIVEN, EDITOR

Assured and Profitable

THERE'S LIFE in the old ones yet. That is one conclusion that can be drawn from the list of the 50 biggest mines in 1955, compiled by *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, and published in these columns last month. Thirty-five of 1955's biggest were in operation in 1945 or before, and the list includes quite a few that have been producing well over a quarter of a century. It goes without saying that these older properties are able to stay in there and pitch with the new ones because they have had the benefit not only of heavy investments in modern equipment but also the benefit of modern merchandising.

A second interesting thing about 1955's biggest is the low strip representation—only four listed as mining by this method alone and a fifth supplementing deep production by stripping. The latter was fifth in the list and was preceded by four deep operations. Strip coal is low-cost coal, but apparently with the equipment available today, plus the rise in overburden thickness, the economics dictate a top capacity of 1 to 1¼ million tons for the average stripper, while 1,246,651 tons was the minimum for inclusion among the 50 leaders.

Thirty-eight of 1955's biggest were commercial mines, indicating once again the growing strength and importance of the commercial side of the industry, particularly in the industrial East and Middle West, and more specifically in the area contiguous to the Ohio River and its tributaries, as a result of accelerated industrialization.

As has been pointed out in these pages previously, a major factor in coal's growth along the Ohio will be the increased electric power demands of aluminum plants and supplementary fabricating facilities. If the grapevine is accurate, all the aluminum companies will have good-sized plants either in operation along the Ohio or building before 1960. Meantime, the old reliables will still continue to account for a good chunk of tonnage. One is steel which, even though the coke rate, as indicated in the study of problems and prospects in the article beginning on the following page, will be brought down significantly in the future, will be consuming increasing quantities of bituminous and may soon be drawing on anthracite as a supplement. The picture in other major markets is equally favorable. Therefore, old or new, anthracite or bituminous, the coal mines of America, properly equipped and operated, and helped by modern merchandising, can look forward to an assured and profitable future.

Still Room

AN EVEN FASTER PACE in the development of new mining techniques and equipment is being forecast by operating men in position to analyze today's development and evaluate the trends of tomorrow. A belt conveyor that can be turned 90 degrees without breaking the belt is one of the developments now in the works. Like others now in being or to come in the future, it will bring the industry another step closer to a high degree of automation, a high degree of production without men at the face, and the lowest in cost for maximum competitive power.

It is now just 20 years since James H. Fletcher put the first rubber-tired haulage unit into the Bluebird mine in Illinois, initiating a cycle that has resulted in widespread changes in face equipment and methods. Tons per man at the face has more than doubled in this period, even though working time at the face is over an hour less. Will another 20 years see a similar increase over 1956? It could happen, but even if it doesn't the emphasis on improved methods and equipment is bound to strengthen coal's basic position as a supplier of energy.

STEEL COMPANIES HAVE DECIDED: one way to cut the heavy cost of expanding output from huge integrated plants is to produce . . .

More Steel Per Ton of Coal

A RECORD LOW COKE RATE and a trend toward less dependence on the finest coking grades will feature bituminous markets in steel during the next 10 yr. Large-scale use of anthracite might also be in the cards, although this realization will require stronger sales and planning efforts than have so far been shown (p 60).

By W. A. RALEIGH, JR.
Assistant Editor, COAL AGE

The changes will stem from a rapidly expanding steel industry which aims to step up its output primarily through increasing the yield of blast furnaces and through expediting the development of new techniques in iron- and steel-making. Basic to all future expansion will be this consideration: maximum production at lowest cost.

Historically, pig iron and coke have paralleled each other up and down the production curve. For every ton of pig iron produced, blast furnace operators today need an average of 1,750 lb of coke. This is a drop from the 1,930 lb rate in 1948. But it's still no better than the 1,730 lb rate achieved in 1933 when efficiency and economy were musts. In fact, the present coke rate, relatively, is not as good as in depression days, considering technological advances that have since occurred in furnace design, coal washing and iron-ore beneficiation.

Now, however, steel industry spokesmen expect that the coke rate

may decline at the most efficient furnaces to 1,300 lb within the next 10 yr. It will probably average out across the industry at about 1,500 lb. This does not mean that the demand for coking coals will not rise—as long as pig iron production climbs at expected sharp rates. But it does mean that future increases in pig iron production will not be accompanied by a corresponding jump in coke needs.

USBM figures show that this trend has already begun. With pig iron production in 1955 up 19 million tons over 1954, the yield of coke from coal (about 70%) would have normally brought a need for 27 million more tons of coal. Instead, added coal needs in 1955 amounted to 24 million tons.

The decline in the coke rate—slower in the immediate years ahead—will pick up momentum in 1959. By this time, planned techniques for boosting blast furnace output up to 25% (illustration, p 59, adapted from *Business Week*) should start to show real gains.

One top executive of a leading coal company sizes up the long-range outlook this way: "Steel production may double in the next 20 yr; the use of coal in the steel industry may increase less than 40%."

The imminence of gains in blast furnace output points to an urgent need for:

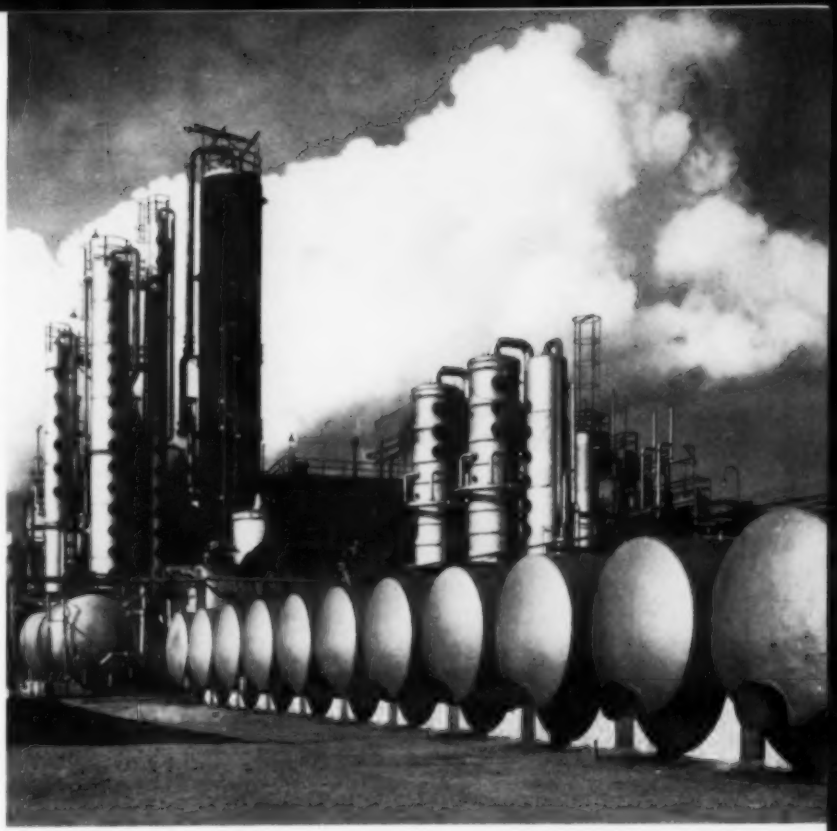
1. Keeping abreast of the carbonizing requirements of the steel industry. More intensive, continuing sales research is indicated. In particular, watch the trends to lower grade and blended coking coals, sintering and pelletizing.

2. Investigating the prospects of converting steam-raising coals into briquettes or other forms suitable for direct use in the blast furnace. One of the largest bituminous producers has already reported progress on the development of such a tailor-made blast-furnace fuel.

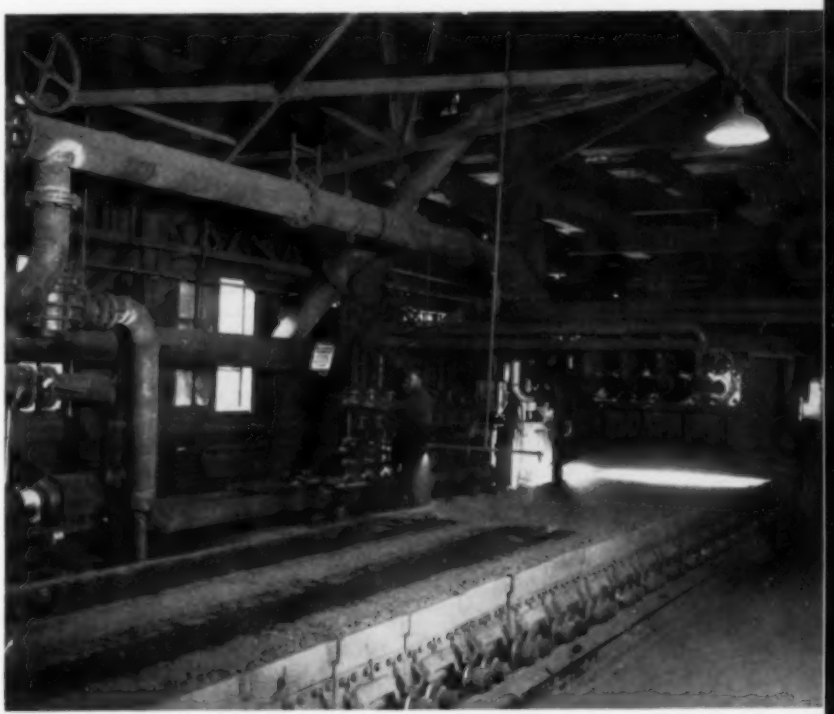
3. Re-evaluating domestic and export markets for metallurgical coals. Don't ever plan to sell domestic customers short. But a major dip in the steel industry's coke rate might open the way to supply greater quantities of coking coals for the fast-growing, apparently permanent export market (*Coal Age*, March, 1956, p 54).

New Expansion Formula

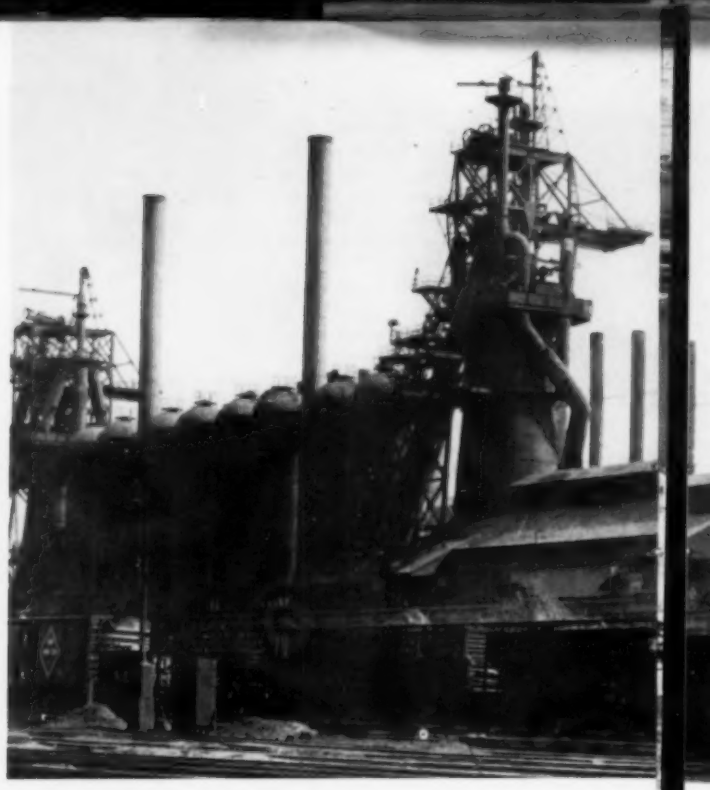
The drive for a major drop in the coke rate is no slap at coal. The steel industry itself is too heavily entrenched in mining coal to make coke for blast furnaces. And there is



CHEMICALS made by the conventional coke oven-water gas process will continue in strong demand. But less expensive processes are needed to insure coal's long-range grip on the lush, expanding chemicals market



NEW SINTERING CAPACITY—high on steel's agenda—will be a major factor in upping blast furnace output for record steel expansion.



THE OPEN HEARTH, BLAST FURNACE AND COKE OVEN will remain as the basis of the Nation's steel economy. But the big push for higher production efficiency presents . . .

no indication yet that the industry plans to scrap its heavy investment in blast-furnace and open-hearth production. But steel management has had to find an expansion formula that would permit the neatest blending of these main factors:

1. The limits to expansion investment that can be financed by present and estimated future steel prices.
2. The depletion of direct-shipping Great Lakes iron ores.
3. The apparent shortage and high price of top-grade coking coals.

The impact of these three factors makes the course clear to men charting steel's future: bear down on the beneficiation and direct reduction of iron ores. Only in this way will they be able to achieve maximum economies with available materials in an era of unprecedented output expansion. Here is how that program looks:

During the next 3 yr, the steel industry plans to up present capacity (128 million tons) by 15 million tons. Over the 15-yr period, 1956-70, new capacity is expected to hit 60 million tons, or average about 4 million tons a year. The total estimated cost has been put at $17.7 billion. More billions will also be spent for replacement of existing capacity.

With this investment—the greatest ever made in a 15-yr period— many observers have wondered why there has been a lag in plans for building new by-product coke ovens. Since 1949, blast-furnace capacity has jumped 19%; coke capacity only 7%. Worsening the situation, nearly one-third of existing coke ovens, 25 yr or more older, are due for replacement.

Steelmen have not been napping, nor unaware of the needs of an integrated expansion program. The answer to the enigma is this: they want to avoid overinvestment in expanded coke-oven capacity. The need for such expansion will be minimized as blast-furnace output per ton of coke is stepped up through beneficiation of low-grade ores and greater use of high-grade ores from overseas, such as those from Labrador and Venezuela.

Some new batteries will be built but the major emphasis will be on replacing and renovating existing ovens. Improvements incorporated into these can add up to 20% more capacity to an oven's output.

And there are always the beehive ovens. Although obsolete and more expensive to maintain, the use of these as a stopgap measure in times of extraordinary need is traditional in the industry. Beehive output tripled in 1955 compared to 1954. The big jump resulted, in part, from steel's comeback last year after dipping in 1954. But indications are strong that some companies will continue to draw more and more on this temporary source until the expected drop in the coke rate takes hold.

Techniques for Coke Economy

Sintering—The sintering of fine ores holds the greatest immediate promise

THIS QUESTION: How can coal compensate for a declining coke rate?

COAL'S ANSWER: More sales and technical research on the changing carbonizing needs of the steel industry.

for coke economies through boosting the productivity of existing blast furnaces. Many leading steel companies are planning initial or added sintering facilities. At the end of 1954, the magazine *Steel* says there was about 32 million tons of sinter-plant capacity; by 1965 trade sources estimate that this capacity may double, with half of the added capacity going into ore sintering and the other half into taconite and jasper beneficiation.

Reporting on sintering and other new and improved techniques in iron-ore processing, *Business Week*, a McGraw-Hill publication, reported (March 31, 1956):

An increasing amount of ore that U. S. steelmakers receive these days is made up of "fines." In a blast furnace, these powdery particles tend to pack, creating a dense, impermeable layer that retards the de-oxidation process by blocking the reducing gases.

By screening out and sintering fines—baking them with a mixture of fine coke—large pieces of rather porous material can be made. One expert says that every 10% of fine ore replaced by sinter in the furnace charge will reduce the coke rate by 40 to 50 lb on each net ton of iron smelted.

The publication cited this example of what sintering can do:

Assume a charge of 1,750,000 lb of coke per day in a furnace that yields 1,000 tons of iron—that's a 1,750-lb coke rate. Assume also that 40% of the iron ore charge has been fines. If those fines are screened out and then sintered before charging, the coke rate goes down to 1,570 lb. However, the furnace will still take 1,750,000 lb of coke per day as its capacity. At a coke rate of 1,570 lb, the furnace will then yield 1,150 tons of iron instead of 1,000 tons—an increase of 11.15%.

Hotter Air—Another promising technique for boosting the output of existing furnaces is through stepping up the temperature of blast air. This is an old and obvious idea. But as long as the direct-shipping Great Lakes ores furnished most of the Nation's iron needs, it hasn't been used. These ores would not take blast temperatures much over 1,000 F. Pushed beyond that heat, the ores tend to "hang" in the furnace, rather than move steadily and evenly down.

Blast furnace operators now hope that improvements will make it possible to step up blast temperatures to 1,300 F or 1,400 F. Although more research is needed, they feel strongly that higher temperatures can be used as beneficiated ores make up more of the average blast-furnace burden. Hotter temperatures will push more iron through the furnace, thus increasing output. They will also reduce the amount of coke required, since hotter blasts mean more by-product blast-furnace gas which can be recycled as fuel into the furnace.

Direct Reduction—Among the boldest new ideas is the "H-iron" process for reducing iron oxide to metallic iron in a single step, using high pressure hydrogen. As an alternative to the conventional blast furnace, the H-iron plant may help solve the steel in-

25% More Iron Possible

dustry's most pressing problem—the high cost of expanding capacity ($300 or more per ton) at today's prices.

The big advantage of the H-iron process is in its simplicity. It eliminates the involved process of charging the blast furnace with limestone, coke and ore in successive layers. It also eliminates the elaborate chemical changes that this mixture goes through in the stack. Instead it works by passing high-pressure hydrogen gas through a mass of fine ore. The hydrogen reduces the ore (iron oxide) directly to iron. The whole process takes place at relatively low temperature, and the product is iron metal which is free of the carbon and sulphur that pig iron ordinarily picks up from the coke in the blast furnace.

The apparent cost-saving advantages of the process have added urgency today because:

1. New blast-furnace capacity is the most expensive and least flexible component of new steelmaking plant —using "steelmaking" to include coke ovens and blast furnaces as well as the open hearths that make steel.

2. The oxygen-converter process, a promising method of increasing steel output, uses a good deal more iron than it does scrap. Thus it tends to upset the metallics balance of existing plants.

No one imagines that the H-iron cycle will make the blast furnace obsolete. The major reason for its development is the possibility of fitting the reducer into an existing integrated steel plant. Among other functions, the reducer could produce 95% metallic iron for electric furnaces; it could also provide a safeguard against the perils of scrap shortage or a scrap price runaway. Detailed engineering studies are under way for using the process commercially.

Trend to Lower Coking Grades

The trend toward concentrated, carefully sized ores may also mean that blast-furnace operators will be less dependent on the highest-quality coke, the *Business Week* report stated. For years, operators have insisted on very hard, lumpy coke because:

1. It had to be strong enough to support the heavy weight of iron and limestone in the stack.

2. It had to be lumpy to allow hot gase to pass easily through the burden.

These requirements forced cokemakers to seek out the best-possible metallurgical coals. The supply of this coal has been getting tight, and the price has risen faster than that of other coals. Steelmakers have been experimenting with blends of high-grade with lesser coals to stretch out the supply of good coking coal.

As larger-sized concentrates of ore are more widely used, the demand for the finest coke should become less urgent. The ore itself will form permeable layers in the blast furnace. That will help the furnace operator both in stretching his coke supply and in keeping down his costs.

Boost for Anthracite?

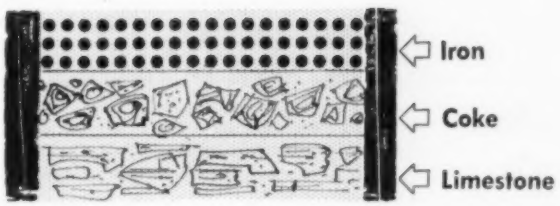
The high price and apparent shortage of top-quality coking coals has raised hopes for a resurgence of anthracite use in steelmaking. The prospects of that resurgence are based on anthracite use:

1. **As a blend in the manufacture of coke.** Sales reached 353,000 tons in 1955, up 54% over 1954 and 58% over the average of the five preceding years.

2. **As a sintering fuel to step up**

By These Techniques

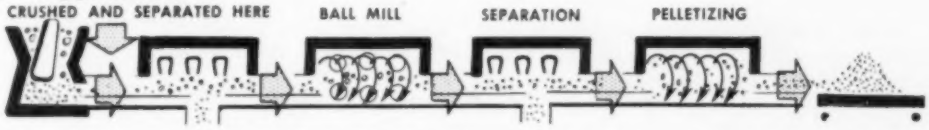
New Charge— Using techniques described below, is less dense, but produces more iron.



1. Beneficiation

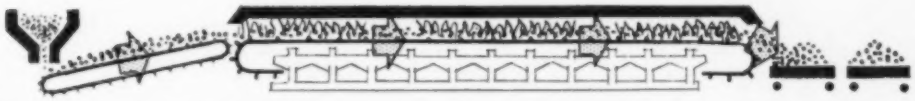
Concentrating low grade (25%-35% iron) ores into a richer product containing 60 to 65% iron yields more iron per ton of blast furnace burden than the 51%-iron content "direct shipping ores." Use of enriched ore lowers slag volume, can raise production rate 10% or more.

2. Agglomeration



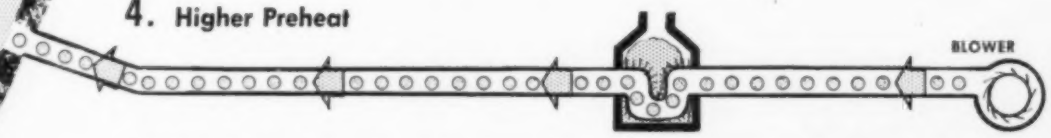
Techniques for combining small particles into larger sized pellets — a necessary part of ore beneficiation — makes for a better furnace charge. Larger ore size encourages an even, rapid flow of reducing gas through the furnace, also prevents loss of fine particles.

3. Sintering



Sintering — baking with fine coke — agglomerates ore into irregular but large sized pieces. These, like pellets, facilitate the flow of reducing gasses. Sintering is costly, but higher ore costs warrant the expense, since less ore is lost as stack fines and de-oxidation is improved.

4. Higher Preheat



Getting the blast air hotter could increase the production rate of blast furnaces. Blast furnace men hope that improvements in ore will make possible an increase of blast temperature from about 1,000F to 1,400F.

Added Output . . .

blast-furnace production. The market here could run up to 5 million tons.

3. As a pelletizer in the processing of low-grade taconite ores. *Keystone* estimates (60) that needs should jump from 8,000 tons in 1955 to 115,000 tons in 1960, 168,000 tons in 1964 and 218,000 tons in 1968.

4. As a direct charge with coke in the blast furnace. The potential here is great, perhaps running up to 8 or 10 million tons. USBM research has shown highly promising results (p 60) in a small, experimental furnace.

No one certainly would want to dampen the hopes of a brighter future for anthracite. The industry has needed and still needs a major boost to achieve a level of prosperity comparable to the industrial community at large. But steel-company executives, still restrained in their enthusiasm for large-scale authracite use, make such comments as these:

• There is no serious problem in the industry's needs for metallurgical coal or coke, except those for sintering purposes. Even though beehive coke is not as desirable as by-product coke, it is still more economical than the use of anthracite as a direct charge. Furthermore, our experience shows that anthracite use causes trouble in the blast furnace. Even if this trouble could be overcome, the cost of using anthracite would generally be prohibitive.

• Greater use of anthracite is up to the anthracite companies. They must find a way to deliver at a lower price than beehive coke—10 to 50c less per ton might be sufficient to attract steel business. With no advantages yet proved for anthracite, economic incentive is vital to break steel companies away from established procedures.

• We are following the anthracite industrial program, but in a period such as now when the production push is so strong, we cannot take chances on any other blast-furnace fuel that might reduce output 5% to 10%. Best bet for anthracite might be for sintering—here the market is active and growing fast.

If anthracite is to realize a major boost in sales to steel companies, such comments suggest the industry as a whole must organize to:

1. Step up anthracite supplies for the rapidly-growing sintering market. More exhaustive reclamation of culm banks for fines might be one answer. Another might be the mining of a low-grade lump or "metallurgical anthracite." This might sell at some price between present fine and lump prices.

2. Promote more aggressively the technical advantages of using anthracite as a direct blast-furnace charge. The results of USBM's research provide a good start.

3. Explore the possibilities of reducing the cost of lump sizes. Although difficult, this may be necessary to break into the steel market. The ultimate result could more than justify any initial sacrifices that producers may have to make.

Both bituminous and anthracite have problems ahead that must be solved to maintain and develop the steel market. However, a major drive for higher efficiency in coal use is not new among coal's customers. It now takes about one-third as much coal to produce a kilowatt of electricity as it did 35 yr ago. In spite of this, sales to utilities have shown and continue to show remarkable gains. Now, steel has undertaken the same push for fuel economy. And, with adequate planning and aggressive merchandising, the net result—a much bigger market—should also be the same.

Anthracite-Coke as a Direct Charge

THE USE of low-shaft blast furnaces with a high proportion of anthracite as the fuel might prove attractive for emergency periods when rapid expansion of steel production is required. Use of anthracite would eliminate the need for concurrent expansion of coke-oven facilities in direct proportion to the increase in iron production. The furnaces could be put into operation more rapidly than conventional furnaces and would require less material for construction.

Anthracite has been satisfactorily substituted for coke for up to 40% of the fuel requirement with Mesabi ore and up to 60% of the fuel with the prepared ores. When smelting pellets, the use of an anthracite for part of the fuel resulted in lower fuel rates, of around 1,450 lb per ton, and higher production at constant blowing rate. Sulphur content of the metal was a little lower when anthracite was used, even though the anthracite analyzed slightly higher in sulphur than the coke it replaced.

Relations between fuel rate and blast temperature, together with other operating characteristics, indicate that much of the chemical and heating value of the fuel is wasted through channeling of gases in the shaft when ores of small size are used in conventional blast furnace practice. Coarse ores not only make possible more efficient utilization of gas but also permit greater advantage to be taken of hot-blast temperature to lower the coke rate.

The successful operation of an experimental blast furnace (3-ft hearth diameter and 21-ft 4-in working height) suggests that commercial operation at high production rates and low fuel consumption could be obtained with lower blast furnaces, if suitably prepared ores were used. A uniform size of raw materials is desirable for efficient smelting in a low-shaft furnace. Construction and operating economies arising from the use of a lower furnace should offset the cost of beneficiating the ore.—*Russell C. Buehl and Miles R. Royer, AIME Blast Furnace, Coke Oven and Raw Materials Conference, April 9-11, 1956, Cincinnati, Ohio.*

Coal Needs for Taconite Production

	Taconite Production (millions gross tons)	Bituminous Needs for Power (thousands net tons)	Anthracite Needs for Pelletizing (thousands net tons)
1955	1.2	36	8
1956	2.6	78	17
1957	5.0	150	33
1958	11.2	336	72
1959	12.5	375	81
1960	17.75	532	115
1964	25.9	777	168
1968	33.5	1,005	218
1972	37.6	1,138	244
1974	40.0	1,200	260
1978	42.0	1,260	273

Data from *Engineering & Mining Journal* and *Keystone Coal Buyers Manual*—McGraw-Hill publications.

The Coal Commentator

Record Utility Market

Coal burned by electric power plants in January, 1956, hit 15,223,796 tons—up 26.7% over January, 1955, and an all-time record for monthly consumption. Of particular significance, Federal Power Commission figures show:

1. Greater coal use in seven out of nine regional areas (or in virtually all coal market areas since there is little or no coal used for power in the West South Central and Pacific regions).

2. Definite gains over both oil and gas use. For the 12-mo ending January, 1956, electric power plants consumed 146,865,533 tons of coal; 74,567,986 barrels of oil; and 1,154,975,267 mcf of gas. These amounts represent gains of 22.9% for coal and 10.7% for oil, and a 0.7% drop for gas, compared with totals for the 12-mo period ending Jan. 31, 1955.

Pointing to a sustained upsurge in coal-power demands, General Electric reports a backlog of steam-turbine generator unit orders totaling 19 million kw in capacity. Shipments are scheduled as far ahead as 1959.

"The utilities have found that increasing demand for electricity over the past several years will not level off, but will increase even faster as more electrical appliances are introduced in homes, and factories purchase electrically operated production equipment." Some utilities, the report adds, "are already considering the purchase of steam-generator units for delivery in 1960 and 1961."

Anthracite Stocks Too Low?

John E. Dodson, president, Weston Dodson & Co., Bethlehem, Pa., calls attention to the near-critical state of anthracite inventories. With only a few exceptions, shipments of domestic sizes have consistently exceeded production since the middle of 1955. By drawing heavily on storage to meet market needs above production, Mr. Dodson indicates that stocks are now moving toward dangerous lows—the lowest in 6 yr. And he adds:

"We believe it would be folly for retailers and producers to bury their heads in the sand and not recognize the situation facing our industry this year . . . it is imperative that orders be placed by dealers to permit mines to move long sizes into the yards to the maximum of retail storage capacity. Further, and no less important, producers this year must lay down reserves at the mines for shipment in months when demand by sizes will exceed industry's productive capacity."

The liquidation of excess inventory is a healthy and necessary part of any selling operation. But such liquidation can ricochet if carried too far—such as when it jeopardizes meeting future demands.

As Mr. Dodson cautions, if anthracite does not closely evaluate and adjust now to its present inventory situation, "annual tonnage, both production-wise and saleswise, will suffer and the coal year 1956-57 could end up with dissatisfied customers and a more precipitous loss to competitive fuels."

Memo on Air Pollution

For effective control of damage to plant life from air pollutants, one must first know the nature and source of contamination. This, however, has always been a difficult problem. Now, **Stanford Research Institute announces the availability of a "tool" for identifying air pollutants that harm plant life. Coal management, anxious to fortify its air-pollution standing with the community, should take heed.**

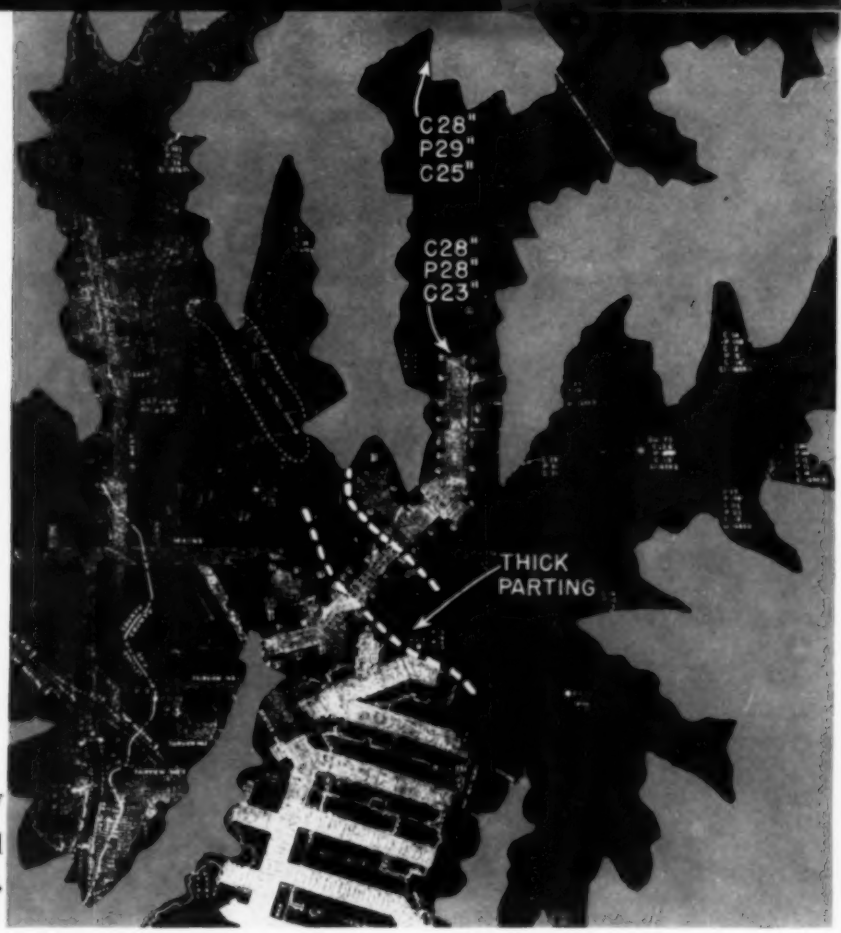
The "tool" consists of a four-volume index containing 200 color transparencies of ten common U. S. weeds that react to various kinds of pollutants. The weeds have been established as standards for areas of suspected damage by the pollutants. "Guinea pigs" represented are annual bluegrass, cheeseweed, chickweed, dandelion, Kentucky bluegrass, lamsquarter, wild mustard, nettle-leaf goosefoot, pigweed and sunflower.

The 4x5-in transparencies are mounted against a white background with descriptive text on facing pages. Each transparency is completely cross-indexed by volume number, weed and fumigant. The pictorial information is also available in a collection of 2x2-in slides which are described in a bound supplement. Prices for the respective collections are $2,400 and $2,170, including a copy of the report, "Development of Standards for Evaluating Vegetation Damage Caused by Air Pollution."

The information was gathered during a 3 yr study by SRI and 13 industrial concerns. Inquiries may be directed to the Industrial Air Pollution Research Section, Stanford Research Institute, Menlo Park, California.

525 Million Tons

In our economic review and forecast (*Coal Age*, February, 1956, p 54), we predicted a minimum 1956 production of 500 million tons and a maximum of 525 million tons. Since this prediction, most economists have agreed that the Nation's prosperity during the second half of 1956 will remain as high as during the first half. We note also that coal output for the first quarter of 1956 ran 17% ahead of the same 1955 quarter. Therefore, **your commentator now believes that there is a firm basis for expecting that 1956 production will reach the maximum predicted—525 million tons.**

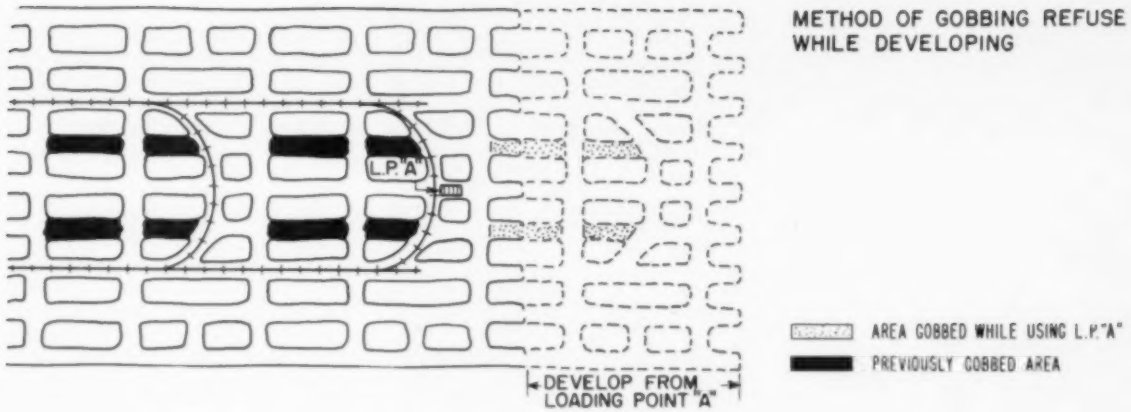


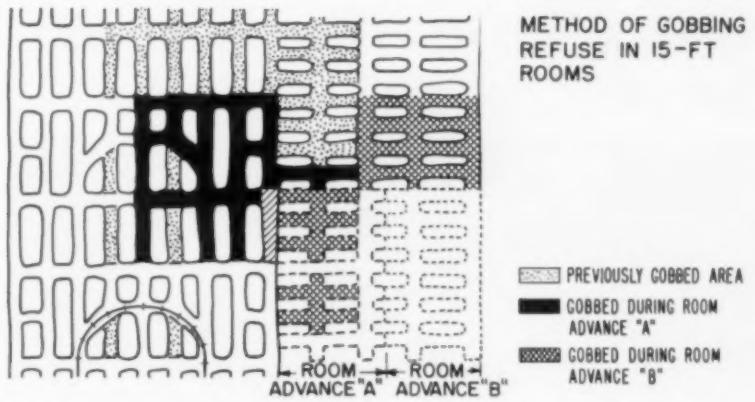
PROBLEM . . .

To recover economically coal with 50% refuse and extend mine life

Teamwork and Ideas . . .

DOUBLE-DUTY MACHINE Selective mining method requires loader to make two or more trips into place to pick up coal and rock separately.





SOLUTION . . .

Skillful mining and underground storage of rock to simplify handling

Beat Thick Parting at Consol

By A. E. FLOWERS
Associate Editor, COAL AGE

MINING AND MAINTENANCE SKILLS, acquired through many years of mining experience, are key factors in the successful mining of a seam of coal with 50% reject at Consol's 204 mine near Jenkins, Ky. Tangible evidence of the success is an output of 22 tons of clean coal per section man in rock parting areas.

DEVELOPING THE SYSTEM

Faced with the dwindling reserves in a mine nearly 40 yr old, the company had the choice of working the barrier pillars for the remaining life or of finding a way to successfully mine coal with more than 12 in of rock parting. Since the Elkhorn No. 3 seam is a high quality metallurgical coal, the company chose to try mining the coal with the thick parting.

A large body of the coal lay ahead of the Bruno portal which had been driven to a point where the rock parting thickened and by all past experience made mining uneconomical. Everybody was nearly convinced that the mining limit was reached. But before pulling out of the area, the company decided to drive a group of rooms off the right side of the entry and experiment with rock handling methods.

To get more information on how to handle the rock parting most effectively, methods included cutting all of it out with a universal cutter, drilling and blasting and gobbing as much of it as possible in wide rooms. This method was essentially the same as had been standard in mining. However, the rock was thicker and therefore more care had to be taken to dispose of it in a minimum of time.

After completing the rooms, the company decided to try driving seven headings, 15 ft wide on 40-ft centers, to experiment in mining coal having an average of 18 in of rock parting. The top coal was 30 in thick and the lower bench was 18 in. In some instances, it was possible to gob part of the rock in breakthroughs and areas where it did not interfere with ventilation, haulage or mining. Other times it was loaded and hauled to the surface. The success in mining this area demonstrated that it was possible to handle economically thicker rock than had been previously believed possible. As a result, the company decided to move equipment and a full crew into the mains again and develop the entry as far as practicable. Using a Joy 14-BU loader, 11-RU cutter, two shuttle cars, self-propelled coal and rock drill, and Duncan roof drill, the crew advanced the headings to a point where the rock thickened to an average of 26 in, and suddenly jumped to 108 in. However, the company had borehole data and outcrop information indicating that thinner rock lay ahead and also indicating that it might possibly be mined. With this knowledge, the company decided to use a curtailed crew and drive four headings through the area with the thicker parting. The parting thinned as predicted and the company is min-

DRILLING Self-propelled drill (above) bores most blastholes with help from hydraulic unit (below) as needed.

CUTTING Key unit in successful mining of seam with thick parting is cutter. Machine cuts coal and rock.

ing it with a full measure of success.

To keep delays resulting from equipment failures to a minimum, spare equipment was used effectively. As soon as a machine developed trouble it was set aside and a spare put in service. The section mechanic then repaired the machine while not performing day to day maintenance work.

MINING 36- to 42-IN PARTING

In areas where the rock parting runs up as much as to 42 in, the sequence of removing the coal and rock separately depends on the hardness of the rock. For example, if the rock is too hard to be cut with the cutting machine the top layer of coal is cut out completely and raked onto the floor. The loading machine then comes in and picks up the coal, discharging it into a shuttle car. Then four or five 2¼-in holes are bored in the rock with a Jeffrey 56 FHR drill. Holes are charged with American Cyanamid Permagil A permissible rock powder.

After the rock is blasted, the cutting machine rakes the broken material off the top of the bottom bench of coal. The loading machine then enters the place for the second time and loads the rock. Next, three or four holes are drilled in the 28- to 30-in bottom layer of coal which is broken with American Cyanamid 14A powder. The loading machine makes a third trip into the place to load the bottom bench of coal.

If the top bench of coal is fairly firm and sticks to the roof, a kerf is placed in the top edge of the rock if it can be cut. Then the rock is blasted, raked out by the cutter and loaded. Both benches of coal are then blasted and loaded. Thus the loader has to enter the place only twice.

A basic ingredient responsible for the successful mining of coal with the thick parting is the higher degree of flexibility in the mining methods. For instance, sometimes a 6-in change in the thickness of the rock parting requires a change in the method of handling it. When the parting is more than 48 in thick, the procedure adopted is to cut the full top bench and rake it out onto the floor for loading. Then the rock is drilled, blasted and as much as possible picked up by the loader. The cutter next rakes out the remaining rock off the bottom bench of coal for loading. Finally the lower bench of coal is drilled, shot and loaded.

MINING 30- to 36-IN PARTING

A fairly economical job of mining can be done in coal with 30- to 36-in of rock parting. With this thickness of rock, a kerf is placed in the top of the rock, which is then blasted and loaded. The top bench of coal usually

adheres to the roof until the rock is removed. Then both benches are blasted and loaded.

Partial pillar extraction has been done successfully in the thick-parting areas. Rooms were driven 18 ft wide and pillars were split. Both benches of coal were recovered in pillar work, except in the last cut of a lift where the rock and lower bench of coal were left in place.

The company reports that successful pillar extraction resulted in a large degree from always having 12 to 14 working places. In some instances the number was as high as 19. The large number of places permitted flexibility in the use of equipment and in mining. Machines could be moved about in a variety of ways and a spare loader could be used for either rock or coal. It was in this type of work that the section crew averaged 22 tons of clean coal per face man.

Thus far, management says that a 24-in parting is the maximum thickness that can be handled economically. One proposed plan for future development is to advance 11 headings to provide plenty of working places. The company expects to use two loading machines, three shuttle cars, spare drill and bolting unit in this work. By having the spare equipment available, little time will be lost as the result of equipment failures.

The company also reaps other benefits from the equipment. If a certain phase of the face cycle, such as difficult cutting is slowing production, the spare cutter can be put in service temporarily to rebalance the face cycle. Most of the face workers can operate one or more machines efficiently, and therefore can move from machine to machine as needed.

WORKER EXPERIENCE AIDS MINING

It is often said that mechanical mining is a young man's job. But that statement has been disproved at Consol's 204 mine. There the average age of all the men in the mine is 45 yrs. And they have spent an average of 22 yr with the company. In the span of their working years, they have developed skills in operating many types of machines. They also have become experts in mining coal with a rock parting that became thicker as the reserves decreased. These men not only have many years of experience, but in many instances have outstanding safety records. For example, one cut-

ROOF BOLTING is done with self-propelled hydraulic machine. Bolts are 42x⅝-in high-carbon expansion-shell type and are set on 4-ft centers.

ROCK PARTING (above) is cut out completely where it is soft enough. After impurities are loaded, coal is blasted and loaded.

MAINTENANCE TRAINING (right) for all employees is sponsored by company. Course includes 10-wk sessions on electricity and hydraulics.

SUPERVISORS AT 204 Andrew Branham (left), mine foreman; H. Carl Mercer, superintendent; and C. L. Adams, maintenance foreman.

AT WORK William F. Wright (left), transitman; Henry Sewell, mine engineer; and Kelly De Simone, rodman.

ter operator has worked for 42 yr without a lost-time accident, a general inside man and a motorman have 40 yr service without a lost-time accident.

Much of the success in mining the seam with the thick parting also results from the experience and ideas of the miners. As new mining problems are met, the men contribute ideas on how they can be solved. By pooling ideas from all sources, the company is able to keep the mine operating.

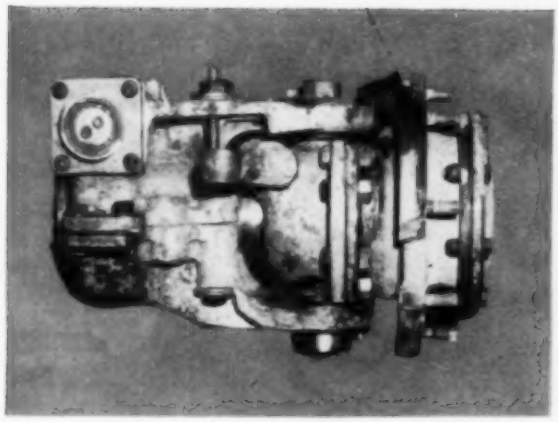
Another important factor in the success at Mine 204 is that machine operators take pride in keeping their equipment in good operating condition. In most instances they help lubricate their own machines and they also can pitch in and help mine mechanics to do repair work. Maintenance work and down time is reduced because the workers are conscious of the limitations of the machines and don't mistreat them. As a result of the efforts of management and labor in good maintenance procedures, an average of 10 min per shift per crew has been cut from delay time.

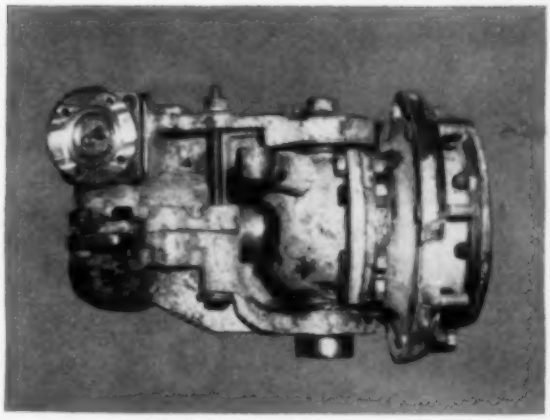
To provide workers with more knowledge of mining equipment and maintenance procedures, the company set up a training program early this year. Operated in co-operation with the Mayo State Vocational School, the training program is divided into two 10-week courses on electricity and hydraulics.

The first portion of the course, now under way, is devoted to electricity. Classes are held in the mine office 4 hr each week, with coffee and rolls provided by the company during short recesses. To permit employees on all three shifts to participate in the classes triple sessions are held. The company pays all the fees, provides necessary books and snacks for all classes. After the men have completed the course, the company plans to honor them with a graduation dinner.

George O. Tarleton is president of Consolidation Coal Co. (Ky.) with headquarters at Jenkins, Ky. Other officials include David A. Zegeer, assistant to the president; J. M. Stauffer, treasurer; R. W. Storey, chief engineer; M. E. Prunty, safety director; and A. C. Dittrick, preparation engineer. H. Carl Mercer is superintendent of Mine 204; Andrew Branham is mine foreman; and C. L. Adams is maintenance foreman.

Check the next two pages for mine-tested ideas that boost Consol's efficiency





Interchangeable Wheel Unit Fits All Four Positions

EASY conversion of a wheel unit to fit any of the four positions on a shuttle car is possible in 5 min at Consol's 204 mine. By making changes to the shaft inside the wheel-drive unit and altering the plate covering the end of the shaft, fast interchangeability has been made possible. Here's what was done.

The original shaft, which was splined on one end and had a keyway cut in the other, was altered as follows: (1) both ends were splined; and (2) each end was drilled and tapped for ⅜-in bolts. The splining permitted the flange coupling that connects to the universal to be fitted to either end of the shaft. Thus no internal changes are necessary to convert from one position to the other. The two holes in the shaft make possible the replacement of a snap ring by a plate securely bolted in place. The bolts are laced with wire to prevent them from becoming loose. The end plate shown in the left photo was made by cutting the outer part off of an old flange coupling.

The unit shown in the left fits the No. 1 position on the car. To convert it to a No. 2 unit, the two bolts in the center are removed from each end and the flange coupling and cover plate interchanged.

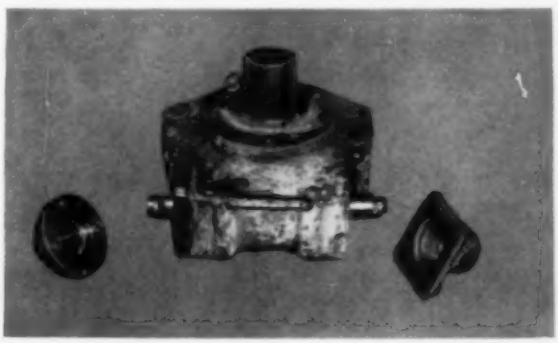
Management reports that this simple change permits a unit to be converted in 5 min whereas it formerly took about 2 hr to reverse the old-type shaft. Costly delays are thus kept to a minimum.

Improved Flange Coupling Saves Universal

LONGER LIFE and trouble-free operation are top benefits from an improved design for flange couplings on shuttle-car wheel units. The beefed-up design features raised sections between the four holes. These take the torque from the drive shaft which was formerly transmitted to the four bolts that join the two pieces. A rigid connection is thus assured.

The flange is designed so that the end of the universal joint fits snugly between the raised sections between the holes. After the two pieces are securely bolted together, the nuts are secured in place with wire lacing.

Design details of the flange are shown in the top photo while an old type flange and torn-up universal joint is shown in the bottom photo.



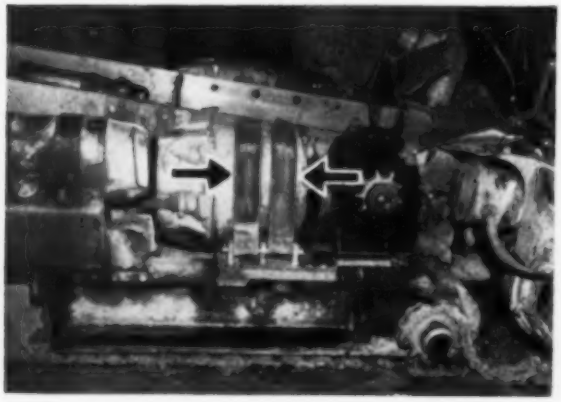
Redesigned Conveyor Drive Serves Left and Right Cars

DUAL SERVICE for conveyor drive units for shuttle cars is made possible at Consol by replacing the standard stub shaft in the drive with a redesigned unit. The new shaft extends from both ends of the housing and is splined on both ends whereas the old one extended from one end only. Either end of the shaft may be fitted with a flange coupling to drive the conveyor. The other end then is fitted with a cap.

The company reports that with this new unit one drive serves either a right- or left-hand shuttle car. In a few minutes a spare drive can be changed over to the opposite side and be ready for service in event of a breakdown. The accompanying photo shows the shaft extended from the housing and the flange coupling and cap near by.

Rim Replaces Lugs for Holding Dual Cutter Wheels

BROKEN BOLTS on wheel hubs and ensuing damage to tires and tubes as a result of slippage has been virtually eliminated at Consol's mines. In place of six lugs held in place by nuts, the company substituted a rim fitted with blocks. The blocks fit snugly into the hub and take the force which formerly had been transmitted to the bolts. Although the rim now takes most of the load, the company has added more strength by replacing ¾-in bolts in the hub with ⅞-in units. Since making the change on the dual-wheel cutters, little or no trouble has been experienced.



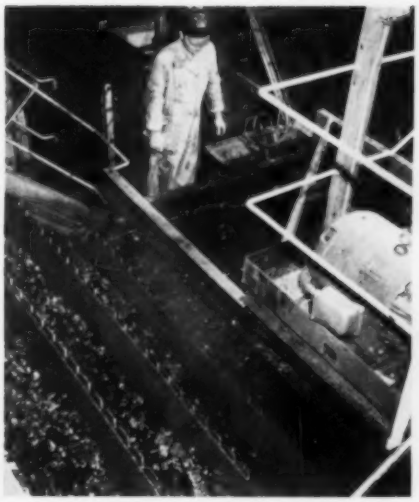
Double Bands Hold Loader Motor Securely

STURDIER SUPPORT for traction motors on 14-BU loaders is provided by double bands that have twice the holding power. If one band should fail during the shift, the other one would hold the motor securely until the band could be replaced between shifts. Motors originally were secured by one band and when it failed the bolts holding the motor base to the frame frequently were stripped. As a result, down time was considerable when this failure took place. With the double bands, the company hopes to eliminate such trouble. The motor base and bands were installed at Consol's 204 shop. Work was done under the supervision of C. L. Adams, maintenance foreman.

Lubricants Pumped From Oil Car to Machines

CLEAN LUBRICANTS are delivered to mining equipment by hose leading from a central storage tank on one section at Consol's 204 mine. To eliminate handling of a number of smaller containers plus the possibility of waste and contamination that usually is present, the company decided to build one large tank. Oil is delivered to a central point in the working area by a hoseline suspended from roof bolts. The tank and auxiliary equipment, including pump, motor and valves, are placed in a supply car which is set off on the supply track. The car is placed so that it can be refilled by the supply crew from a large oil car at the same time other supplies are delivered.

NEW FREEMAN PLANT is fed directly from slope belt



LESS THAN ½ lb medium per ton of feed

First U. S. use of Dutch State Mines heavy media system features . . .

Coal Cleaning at Freeman No. 4

By EMERY O. MILLIGAN,
Preparation Engineer
Freeman Coal Mining Corp.,
Marion, Ill.

UPGRADING COAL TO MEET COMPETITIVE MARKET CONDITIONS and to secure highest possible realization are the big reasons why Freeman Coal Mining Corp., built a new preparation plant at the company's No. 4 mine near Marion in southern Illinois. The mine is operated in virgin acreage containing 50 million tons of mineable coal, and the new 500-tph plant is fed from underground by a 42-in slope belt, approximately 1,300 ft long on a 16-deg incline. [A full description of the mine and underground operations appears in *Coal Age*, April, 1954, beginning on p 78.–Ed.]

The washing function in the plant is carried out in Dutch State Mines heavy media vessels, the first of this type to be used in the United States. Development of the system began in the 1930's, when the circumstances at the time required improvement of the older jig washers and development of a system that could handle raw coals which could not be cleaned satisfactorily in the jig washers. Through the years numerous tests were conducted in plants and laboratories, and out of these investigations came the shallow-trough washer in 1938, using a stable or semi-stable heavy medium.

The advantage of the stable system is that no currents are required to keep the medium in suspension, thus simplifying the medium recirculating system. The vessel was designed to be as simple as possible to build, maintain and operate, and to absorb wide variations in load without reflecting this in the clean coal. The medium must be low in viscosity and should not be affected by pollution with fine coal, shale and slime, provided these solids are kept within certain limits.

The shallow-trough vessels at Freeman No. 4 meet these requirements. The simplified unit employs only one drag conveyor to remove both products. The top run is used to feed the vessel, then submerges in the medium and collects the float material. The clean coal is moved over a stationary drainage screen built into the vessel and is discharged directly onto a rinsing and dewatering screen. The bottom run of the drag conveyor collects all the sink material and delivers it to a rinsing and dewatering screen underneath the feed end of the vessel. The speed of the drag conveyor and the shape of the vessel are such that enough motion is created in the medium to prevent settling during normal operation. The magnetite used at Freeman No. 4 is the fine grade, 90 to 95% through 325 mesh.

Another feature is the specific-gravity control circuit. The system is completely automatic and recording, originating at the Dutch State Mines around 1940. It has been improved during the years and now has proven to be very satisfactory.

The principle of the system is that when a diptube is submerged in water a certain pressure is required to force the air to escape. This pressure increases with increasing depth of submergence. When applied to a liquid with a density higher than that of water, it is found that at the same depth of submergence the pressure required to make air bubbles escape is in proportion to the density of the liquid. Therefore, with a constant liquid level one tube could be used.

However, fluctuations in the liquid level cannot be avoided, making it necessary to use two diptubes of different length. Then it is found that the difference in air pressure in the two tubes is proportional to the specific gravity of the bath.

The difference in pressure is relayed to a Foxboro recorder which registers the signal on a chart graduated in units of specific gravity. The recorder has a master needle which is set for the required specific gravity. This gravity corresponds to a certain pressure. When the signal received by

the recorder is equal to or less than the air pressure controlled and set by the master needle, no reaction occurs. However, as soon as the received signal is greater in pressure than the air pressure of the master needle, a pilot valve is actuated to admit compressed air into a diaphragm-operated needle valve. The needle valve is located under the thickener and admits medium of high density into the vessel.

As long as the received signal is in excess of the pre-set valve reading the needle valve remains open and admits more medium to the vessel. When the specific gravity reaches the desired value, where the received signal is equal to the pre-set valve reading, the pilot valve closes and this action closes the needle valve.

Since wet screenings are handled at Freeman No. 4, there is a tendency for the specific gravity in the vessel to drop because of the water adhering to the coal entering the vessel. Therefore, high-density medium is introduced into the vessel to compensate for this water in proportions that will maintain constant gravity. With this control the operator is free from testing and can give all his attention to the mechanical operation of the plant.

The diptubes which measure the density are placed in a sloping position in a chamber on the side of the vessel. The ends of the tubes are in the separating zone of the bath and it is here that the density is measured.

With the Dorr thickener installed directly above the vessel and having ample storage capacity for concentrated medium, strict control over the gravity of the bath is provided. In a matter of about 2 min the gravity in the vessel can be raised or lowered 0.10 sp gr.

How coal from the Illinois No. 6 seam is cleaned at Freeman No. 4

THE SLOPE BELT discharges onto an apron feeder which conveys the R-O-M to a combination scalping screen and picking table. The scalping screen separates the R-O-M into plus 6-in lump and 6x0 raw coal. The plus 6-in is hand-picked and rejects from the picking table are discharged directly into the refuse bin. The plus 6-in coal is crushed in a Jeffrey single-roll crusher to minus 6 in and joins the 6x0 raw coal to be conveyed to two 6x12-ft and two 6x10-ft Allis-Chalmers Ripl-Flo screens operating in tandem.

The raw coal is separated on these screens into 6x1, 1x¼ and ¼x0 fractions. The 6x1 and 1x¼ are fed to separate 9-ft Dutch State Mines heavy-media vessels. The ¼x0 is conveyed to the air-washing plant for cleaning in two Roberts & Schaefer SuperAirflow cleaners.

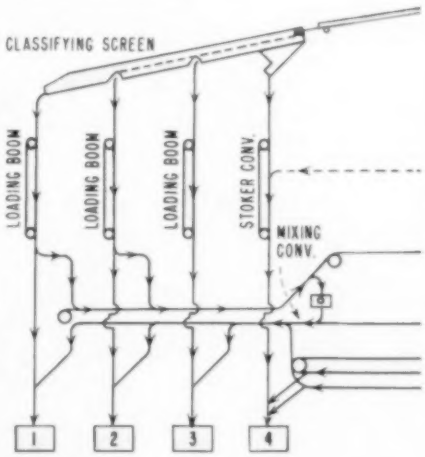
Rejects from the heavy media vessels and the air cleaners are conveyed to a 2-compartment, 5-cell Jeffrey Baum jig. The total amount of reject from the plant is constant, regardless of the gravity used in the heavy-media plant. Both refuse elevators of the jig discharge directly to refuse.

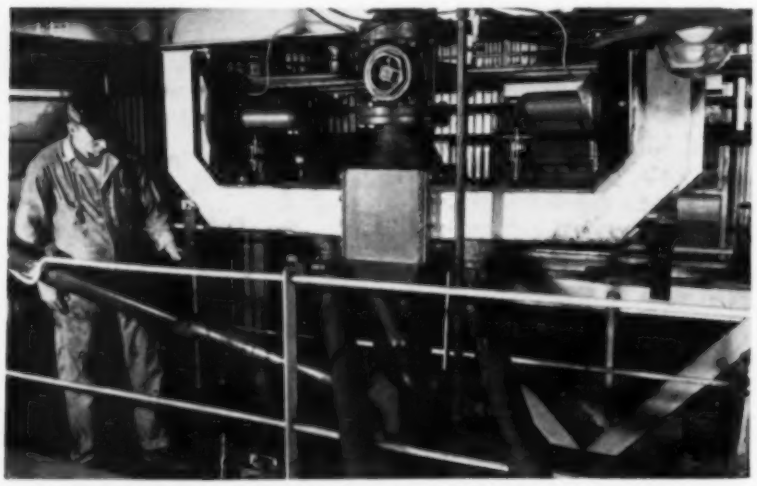
The float coal from the jig is dewatered and screened on a 5x12-ft Lo-Head screen. The coal is screened at 6x⅞, which is fed to an American AC2 crusher, crushed to minus ⅞-in and rewashed in the jig. The ⅞-in x 10-mesh is clean coal and is conveyed to the car for loading. The 10-mesh x 0 is collected in a settling tank from where it is pumped to a dewatering screen with a deck of ¾-mm wedge-wire. The discharge of the dewatering screen may be directed to refuse or to the mixing conveyor.

After the coal is cleaned it is conveyed to the rescreening plant to be separated into these sizes: 6x3, 3x2, 2x1½, 1½x¾, ¾x10 mesh and 10 mesh x 0. An oil-treating system has been installed to serve them.

The plant is equipped with mixing conveyors for blending different sizes, and all five loading tracks have been provided with Brown-Fayro car retarders for layer loading.

The crushing plant is capable of crushing all the plus 1¼-in coal to minus 1½ in and screening it into 1¼x¾, ¾x10-mesh and 10-mesh x 0 fractions, which can be blended or loaded separately.

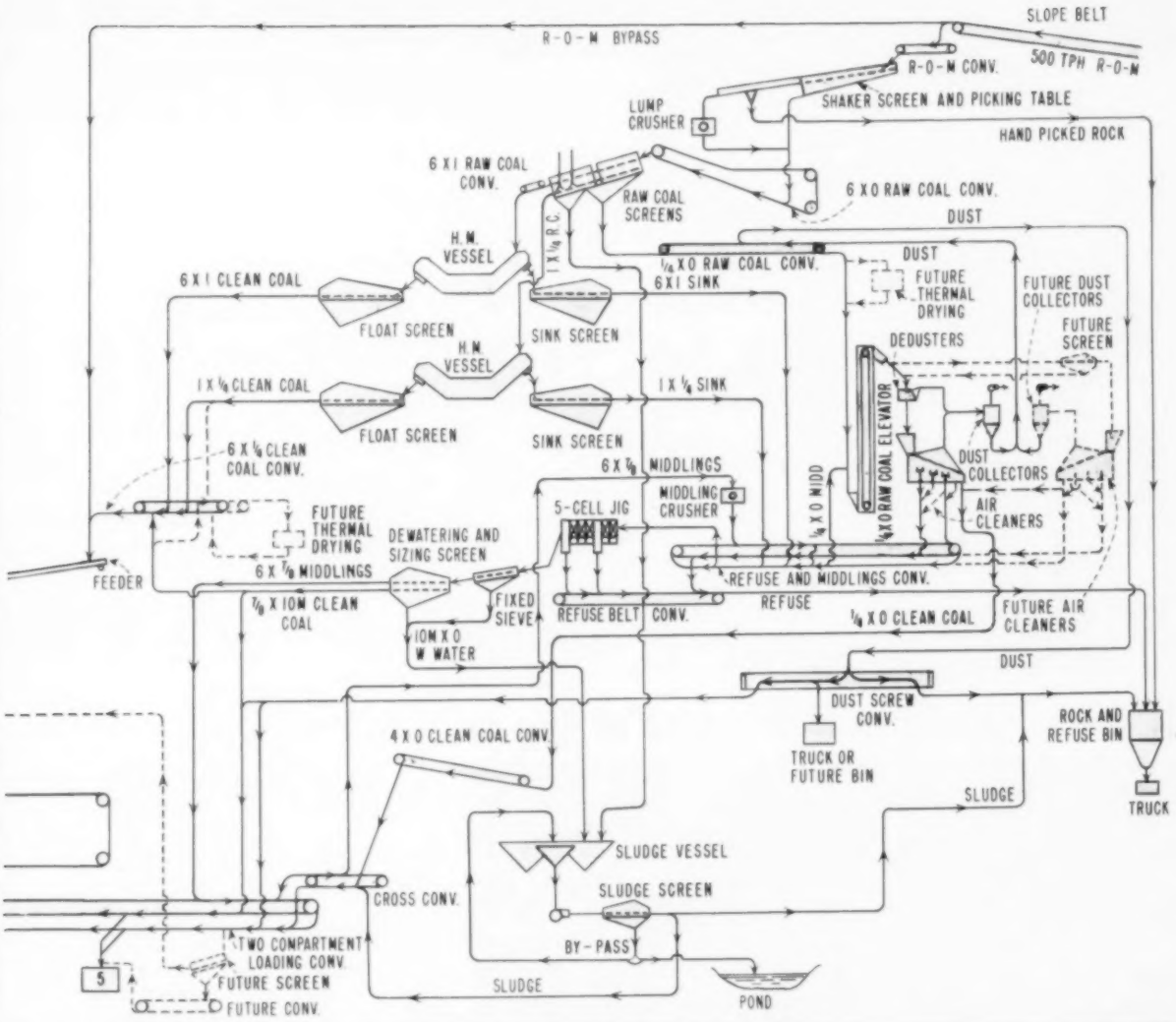




AUTOMATIC VALVES feed medium from thickener to vessel

The result is that an added degree of flexibility becomes available in a system that already features prescription loading. We can now load, without interrupting production, cars of clean coal with entirely different but closely controlled ash content, thereby meeting any requirements of our customers and the company sales department.

The air washing plant is similar in setup to those at Freeburn, Crown and Orient mines. The ¼x0 raw coal is dedusted in cascade-type dedusters. The dedusted coal is cleaned in two 6x12-ft SuperAirflow cleaners. Middlings may be recirculated or conveyed to the Jeffrey jig. Refuse from the air cleaners may be rewashed in the jig or transported directly to the refuse bin. Final ash in the clean coal meets our specifications and the prod-

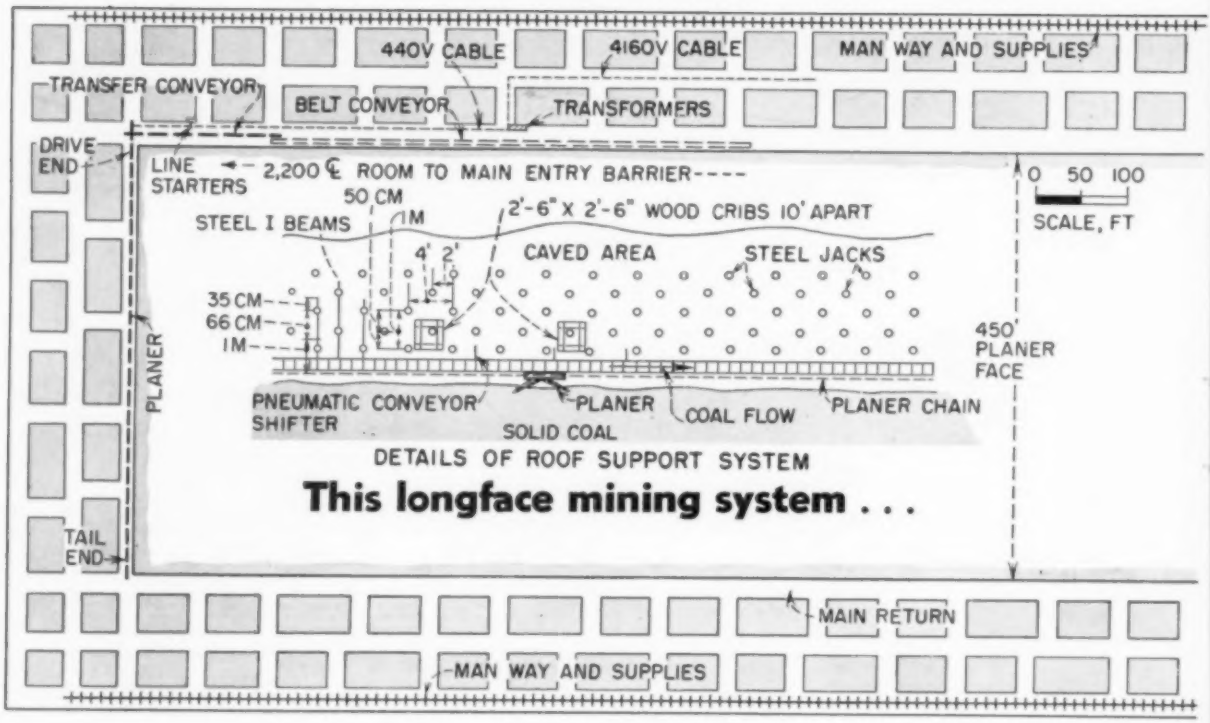


uct is screened at 10-mesh in the re-screening plant.

The washing and air cleaning facilities at Freeman No. 4, with Roberts & Schaefer collaborating on the design, went into operation in April, 1955, and after about a week of adjustments was in full operation two shifts a day, five days a week, without serious problems of operation.

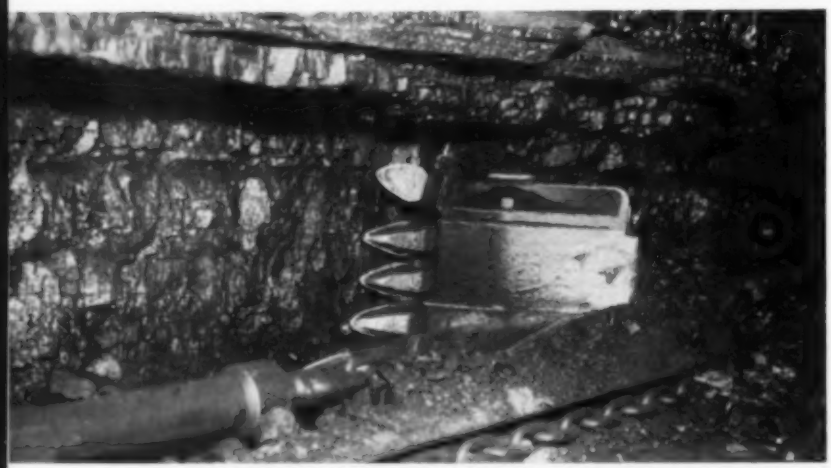
Power for the plant is supplied from a 1,500-kva transformer station at 480 v, 3 phase, 60 cycle. The incoming power is taken to a control center which is protected by a 1,600-amp main breaker with an interrupting capacity of 50,000 amp. All motors are interlocked in sequence with the flow of coal to prevent pileups of coal in the event of motor trouble, although the bench boards are equipped with selector switches.

RECLAMATION CIRCUIT—two cyclones, separator, thickener



This longface mining system . . .

▼ with this coal planer is . . .



PLANER moves back and forth across face while taking 3-in slices.

Getting

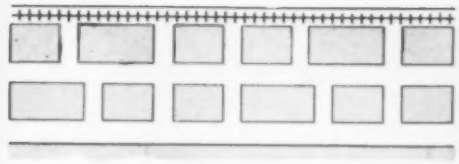
GOOD ROOF CONTROL, maximum recovery of coal and big savings in supply cost are benefits resulting from longface mining at the Amherst Coal Co.'s No. 4 mine, near Accoville, W. Va. After a year's experience with longface mining in the lower split of the Eagle seam, Amherst is producing an average of 500 tons per shift with 24 face men. Under ideal conditions with good roof pressure, output from the 40-in seam has been as high as 1,000 tons per shift.

MINING CONDITIONS POSE PROBLEM

Amherst has been mining the Eagle seam in Logan County, W. Va., for

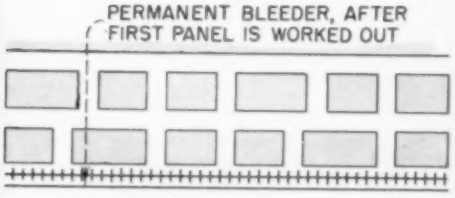
◀Mining results

GOOD FALLS follow extraction of coal. Roof breaks in straight line near the jacks protecting the working area.



HOW EQUIPMENT is set up and roof controlled in longface mining at Amherst Coal. Coal moves in continuous stream from face to outside over system of conveyors.

LONGFACE MINING permits maximum recovery of valuable high-quality metallurgical coal. Excellent roof control in lower split of Eagle seam under 700 to 800 ft of cover is an important factor in the success of the method.



Lower Costs at Amherst Coal

about 50 yr. The coal normally occurs in two benches which are separated by a layer of rock of varying thickness. In some areas the parting increases to a thickness that makes it uneconomical to mine both benches. Since the Eagle seam is a high quality metallurgical coal with low ash and sulphur, the company makes every effort to recover as much of it as possible by mining one of the benches.

Amherst has been mining the lower bench for about 15 yr. The lower split is clean except for a thin parting of bone near the top and averages about 40 in. A weak, gray shale that weathers badly forms the immediate roof and is a formidable problem in mechanical mining. The bottom varies from fireclay to a sandy shale and usually is firm.

A number of mining methods were tried in the past while mining the lower bench. For many years it was successfully recovered by handloading onto chain conveyors. However, since the end of World War II the boost in labor costs coupled with the declining realization made the method uneconomical. As a result crawler-mounted loading machines and bridge conveyors were introduced. This combination proved successful to a degree.

Realizing that supply and labor costs would increase in the future while coal prices tended to decrease, the company searched for different mining methods. As a result of reading literature on longwalling techniques in Europe, the company became interested in the coal planer. In 1952, Herbert Jones, Jr., vice president in charge of operations, accompanied six other men in making a study of German mining methods for the Mutual Security Administration. During this visit he was impressed with the possibilities of the coal planer. Working under much more adverse conditions than found in the U. S., the plane: performance in Germany compared favorably with many coal operations in this country.

The company studied the various types of planers and found the Lobbe Hobel unit best suited to Amherst's needs. In June, 1954, negotiations were completed for delivery of a plow to Amherst's new Logan County mine.

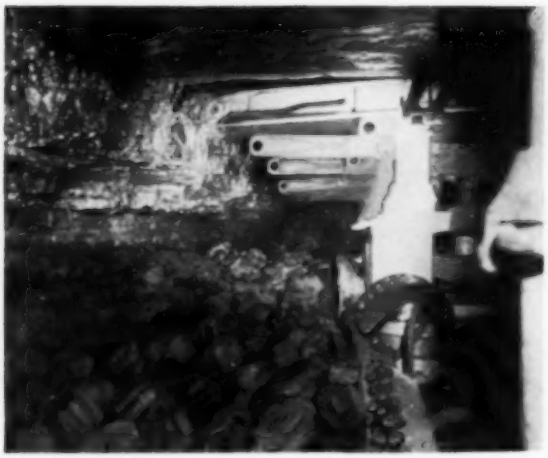
DEVELOPING THE MINE

Amherst's No. 4 mine was opened in June, 1952, to replace the No. 3 mine. Mining equipment used for the development of the mains included a Joy 12-BU loader, Long chain conveyors, Sullivan 11B cutter, Jeffrey A7 coal drill, Chicago Pneumatic roof bolting machine and Jeffrey 30-in belt conveyor.

Six headings were advanced on 70-ft centers in groups of three, using a loader, three gathering conveyors, one mother chain and the belt conveyor. As soon as the mains were developed far enough, panel headings on 60-ft centers were driven off the right side. A second production unit was added to mine the panel headings while the mains were being advanced. A third unit was later added.

As the main headings were advanced, 36-in expansion-type roof bolts with 6x6x¼-in bearing plates were installed on 4-ft centers. The same pattern was carried out in the panels. *(Continued on next page)*

AIRPICKS are used to break top coal loose if roof pressure is not sufficient or coal is "burned" to roof.



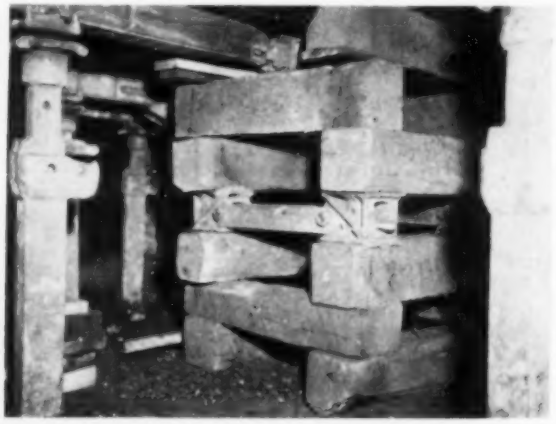
VIEW OF FACE shows steel beams cantilevered from jacks and extending over face conveyor.

What the Working Area Looks Like

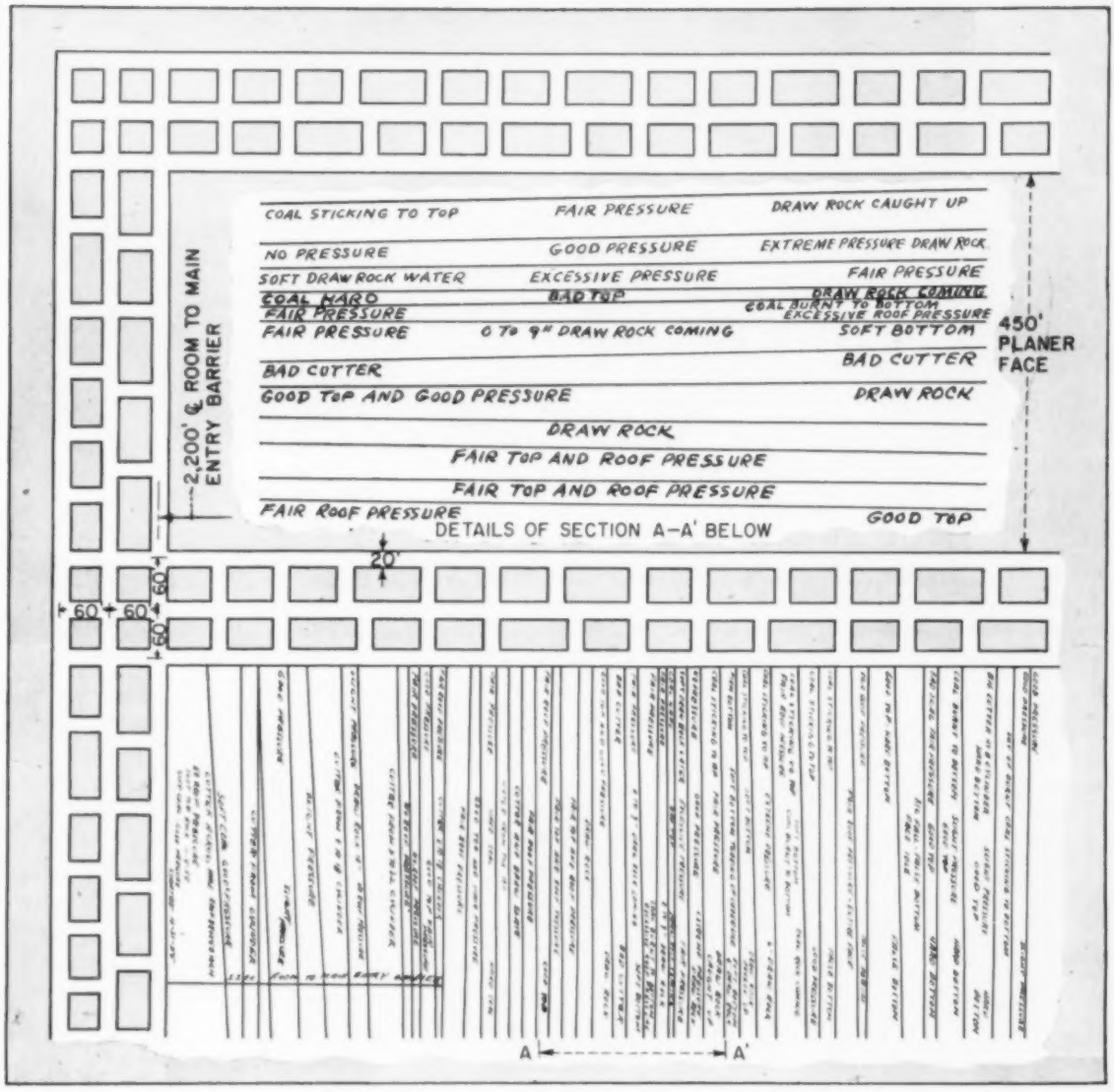
PLANER HEAD DRIVE has pushbutton controls for operating unit. Operator uses phone to communicate with men.

TRANSFER ELEVATOR receives planer coal from double-chain conveyor and discharges it onto 30-in belt in entry.

AIR COMPRESSOR supplying air at 65 to 70 psi to face equipment is located in surface building.



CRIBS, set on 10-ft centers, are built with steel releases that permit easy recovery for resetting as face advances.



Progress Map of Longface Shows Day-to-Day Conditions

DIFFICULT PROBLEMS IN ROOF CONTROL

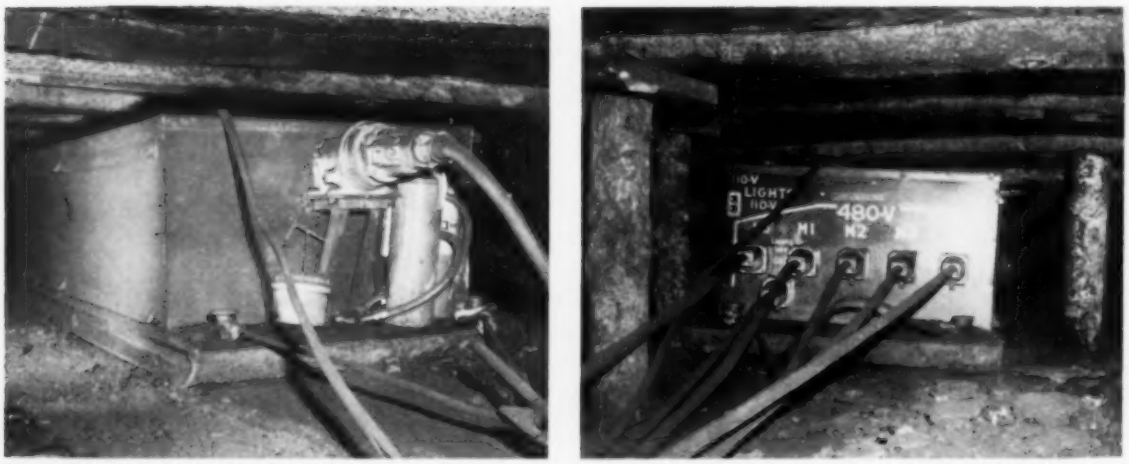
The first problems with roof control were met in the panel development where there were minor falls. Although timbers were closely spaced to supplement bolts, the roof broke them. Considerable difficulty also was experienced in the room work.

As soon as the coal planer was ordered in 1954, mining projections were changed to prepare for the longface mining. Three headings on 60-ft centers were driven 2,500 ft deep and then a pair of rooms was advanced 450 ft off the headings to establish the longface. However, before the planer territory was fully developed roof conditions became so bad that the company decided to pull out of the area and develop new territory.

A new set of mains was driven parallel to the six previously driven and a new method of roof support was adopted. To provide more support, the company decided to set 3x8-in by 16-ft crossbars on 4-ft centers in all panels. Main-entry timbers were to be 5x7x16-ft creosoted crossbars set on 8x8-in treated l gs and also held by three 48-in roof bolts. To assure maximum security for the bars in the panels, each was supported by three legs plus three 36-in roof bolts. The system was also adopted in the new area developed for the planer and has been successful in both areas.

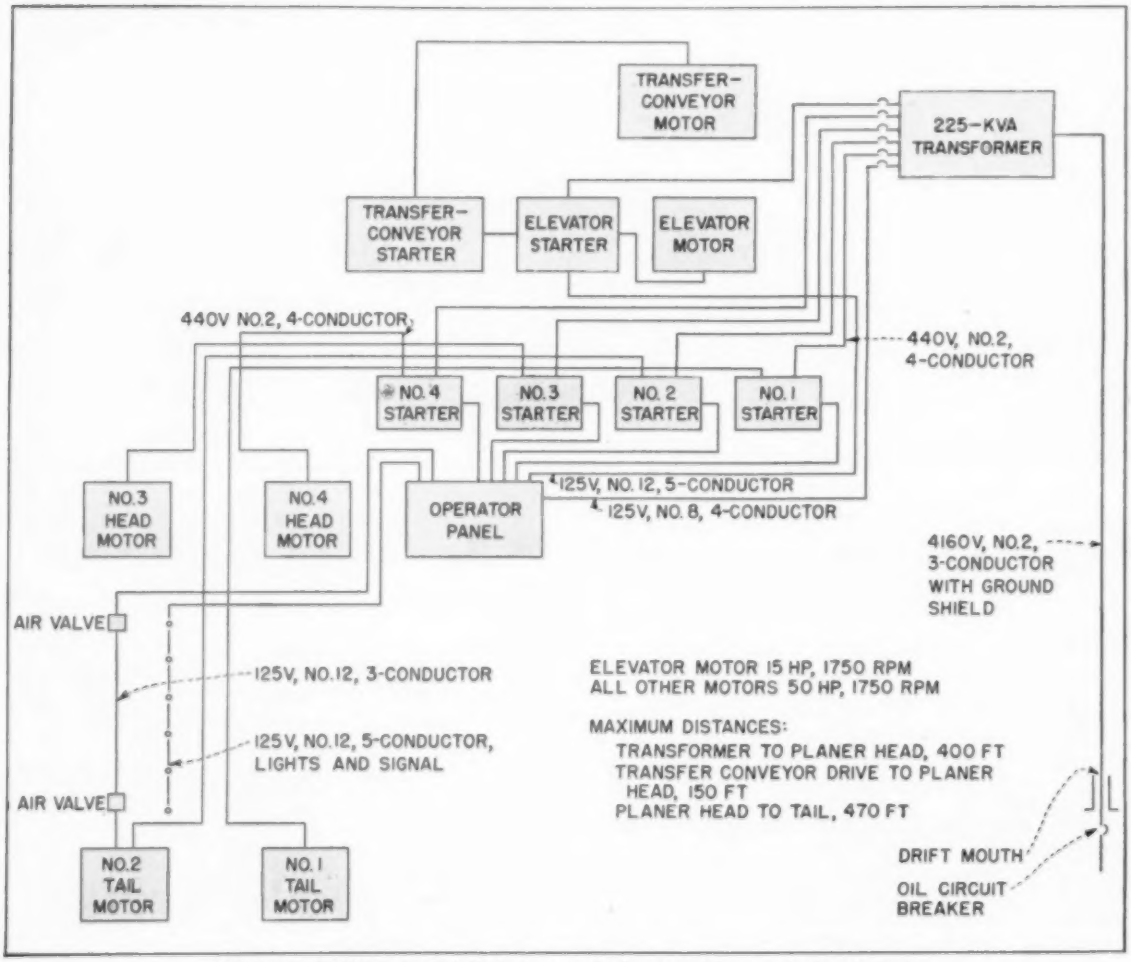
DEVELOPING THE LONGFACES

Two sets of entries, with three headings each, were driven to a depth of 2,500 ft to prepare the first longface. Two rooms then were advanced between the two entries to establish the

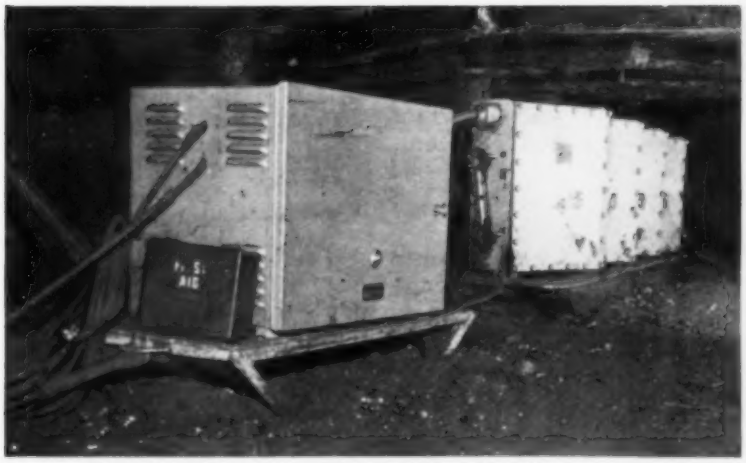


SKID-MOUNTED TRANSFORMER (left) steps 4,160-v power down to 440 for face equipment. Outlets (right) also are provided to supply 110-v power for lights and controls. Power cables are joined with permissible connectors.

Specially Designed Electrical Equipment Simplifies



HOW AC POWER is distributed to coal planer section at Amherst Coal.



COMPACT AC electrical equipment is mounted on skids for easy moving in thin coal. Units are pulled back by hoist as mining advances.

CONTINUOUS RECORD of operating time is kept by this electric device.

Power Distribution, Records Work Time

longface and provide a bleeder. To provide easy access to each end of the longface a supply track was laid in each of the development entries. The planer then was hauled in over these tracks and set up in the outby room.

While the planer was being set up, the company completed plans to instruct the workers in the new method. Men were selected with special emphasis on their ability to fit into the various jobs connected with longface mining. Before the men were permitted to work in the longface area they were given instructions in safety, told how the mining system worked and how to use the equipment properly. Before the planer was taken into the mine they had an opportunity to see it set up outside and learn the fundamentals in its operation.

When the planer went to work on Feb. 2, 1955, the first 30 min of the shift was spent reviewing and discussing the new system. Follow-up discussions were held every three days to iron out problems as they were met. To help the men on their new jobs during the break-in period, the company assigned extra supervisors to the area. Travis Grimmett, mine foreman, coordinated the early longface work and continues close daily contact with the work.

EARLY PROBLEMS

Roof control, the key to successful longface mining, was the toughest problem Amherst had to solve in the early planer work. Most of the problems arose as a result of inexperience in using collapsible roof jacks and in longwall mining. But as the men gained experience they learned to gain speed in moving and setting jacks and cribs. They also learned the importance of keeping a straight break line along the gob.

Early problems were not confined to roof control. As a result of inexperience and ensuing improper adjustments of the planer, bits on the plow were broken, the plow chain sometimes was pulled apart, the complete unit walked or the plow became fouled. The company soon developed techniques for eliminating these early difficulties. For instance, an anchor was made to hold the tail drive securely and thereby eliminate buckling of the panline. The anchor consists of a piece of 90-lb rail held down by two roof jacks and a large ship's turnbuckle that connects to the tail drive. Pneumatic air jacks that keep the conveyor against the face were angled toward the drive section to help keep the panline in position.

A further improvement in plow performance was achieved by two more changes: (1) reducing the plowing depth from 5 to 3 in; and (2) lowering the air pressure for jacks and clutches on the drives from a range of 80 to 90 psi to one of 65 to 70 psi. With the lower pressure, the company reports that there are fewer mechanical failures.

TODAY'S RESULTS

Output from the plow is averaging about 500 tons per shift. This represents a 9-ft advance of the 450-ft longface. The face has been advanced as much as 18 ft per shift, or double the average, but this was done by taking a thicker slice and straining the conveyor, and with ideal mining conditions. The company has learned that the greatest overall efficiency is achieved by a steady output, somewhat under maximum capacity.

Face personnel includes 16 roof-support men, who set collapsible roof jacks and build cribs; 2 cylinder men, who operate the cylinders that advance the face conveyor; 3 head-drive men, who operate the head drive and perform various other jobs in that area; 3 tail-drive men, whose duties are similar to those at the head section; 1 elevator operator; and two foremen.

To permit fast and easy communication along the 450-ft face, Femco phones are installed at key points. Units are spaced at 150-ft intervals along the face, at the head and tail sections, elevator to the belt conveyor, shop and outside mine office.

Electric lights are installed at 20-ft intervals along the face conveyor. These not only illuminate the working area but also are useful for signaling and aligning the conveyor. Only the foremen, head-drive and tail-drive operators are permitted to use the lights, except in an emergency.

HOW ROOF CONTROL WORKS

Roof is supported by a combination of Urdingen steel jacks and headers and timber cribs. Jacks are collapsible units that are removed and reset as the face advances. Cribs are built with 5x7x30-in timbers and are fitted with steel releases that permit them to be recovered. They are set on 10-ft centers in a staggered pattern between

COAL MEN ON THE JOB . . . Amherst Coal Co., No. 4 mine. Seated: Max Blair, (left). mine clerk; Clyde Gibson, planer foreman; W. Wyers, Gerlock Jack Co.; Bernard McCane, night mine foreman; Carl Brown, loader foreman; and Homer Copley, assistant mine foreman. Standing: Frank Duba, loader foreman; Herbert Colston, planer foreman; Conley Carlton, loader foreman; Robert Phillips, loader foreman; Estel Walker and Robert Imes, planer foreman; and Travis Grimmett, general mine foreman.

the first and last rows of face props.

The jacks are set in five rows 2 ft apart along the face and 39 in apart in rows at right angles to the face. Rows are staggered to form a diamond pattern. Running 90 deg with the face and connecting the jacks are 4-in H beams that have a hole in one end and a hook on the other to permit connection. These provide continuous support from the fall line to the face. A special shoe permits the beams to be cantilevered from the last jack to the face.

The first jacks were non-yielding units. But the bottom generally proved too hard for the jacks to penetrate. The rigid jacks were selected on the premise that they would penetrate the rock as the roof pressure increased and thereby permit the roof to bend.

In some instances, the floor was soft enough for the jacks to dig in. When this happened, any excess roof pressure was relieved and the roof remained solid in the working area. Since penetration was not possible at all times, the company decided to try yielding units. In the present panel, Gerlach duplex yielding units are being substituted for the rigid units. The yielding jacks are fitted with special wedging devices at the top to speed setting. The company estimates that the device will cut setting time in half and roof control will be improved.

HOW PLANING IS DONE

The longface equipment includes the planer unit which is pulled across back and forth along the 450-ft face while taking 3-in slices; and a double-chain flight conveyor that receives the plowed coal and carries it to the entry. The planing head travels back and forth at 72.5 fpm and the face conveyor moves at 145 fpm. The face conveyor discharges onto a chain conveyor in an entry and is transferred to a 30-in Jeffrey belt conveyor by a company-designed elevating conveyor. The coal then travels by belt to the outside. The elevating conveyor is coupled to the drive head of the entry conveyor. Both are pulled as a unit by a Brown-Fayro hoist when moves are made as the face advances.

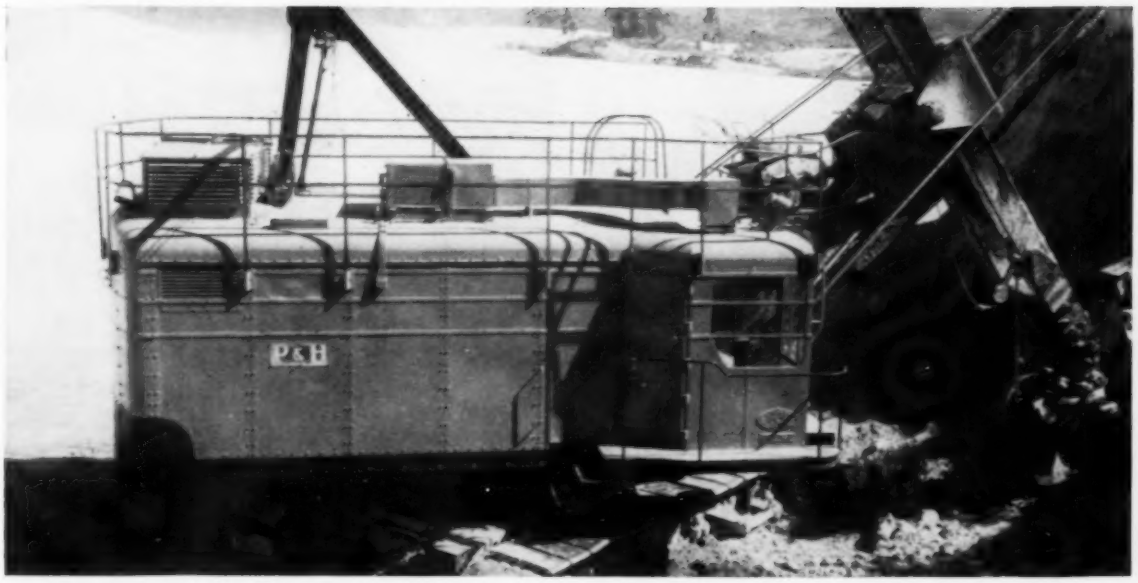
The planer is adjusted to cut slightly below the parting near the top of the seam. Thus the impurities remain in larger pieces which are easier to remove. A total of 200 hp is available in the head and tail drives to move the planer across the face and operate the face conveyor. Each of the drives is equipped with two 50-hp AC motors which transmit driving power from the gear boxes to the sprocket drums of the endless double-chain face conveyor and to the drive wheels of the planer. The original chain that hauls the planer back and forth across the face was designed to withstand a 50-ton pull. But this will shortly be replaced by one having a 65-ton breaking strength.

The face conveyor is assembled from sections approximately 30x59-in which are designed to permit a 4-deg swing to either side. This enables the conveyor to be pushed close to the face as the planer slices coal. Power lines for face lights, mounted at 20-ft intervals, and the tail drive along with compressed-air line for the pneumatic jacks are enclosed in a steel conduit mounted on the gob side of the face conveyor.

Compressed air for the 24 pneumatic jacks that advance the face conveyor is supplied by two Ingersoll Rand compressors mounted on the surface. Air is carried to the mouth of the panel through a 4-in pipeline which is fitted with two receiving tanks. A 2-in line, also fitted with a receiving tank, carries the air into the longface panel. A 200-ft section of high-pressure air hose joins the 2-in line to the planer equipment. The length of hose permits flexibility so that the face can be worked for a full week without changing the pipeline. At 10-ft intervals along the face there are ¾-in taps for connecting various air-driven tools, such as, picks and drills.

Power for the planer operation is delivered to the section at 4,160 v by a 3-conductor Super Coronal Geoprene cable which terminates at a General Electric 225 kva transformer. Protection for the high-voltage circuit is provided by a Westinghouse oil circuit breaker with a ground-fault detector and overload protection. The transformer provides 440-v power for operating the various motors on the face units and also furnishes a 110-v source for lights and controls. Power cables leading from the transformer to the panelboard and equipment are joined with Ensign permissible cable connectors. The push-button controls consist of a group of panels mounted on skids for easy moving in the thin coal. Controls and panelboards were designed and built by Ensign. The company reports that they have had no trouble with the AC power setup.

H. E. Jones is president of Amherst, with headquarters at the company's new office at Reed, W. Va. Other members of the management team include H. E. Jones, Jr., executive vice president; G. W. Jones, vice president, equipment; F. L. McLain, vice president, purchasing; A. S. J. Hopkins, vice president, engineering; W. G. Beddow, production manager; N. W. Byers, preparation manager; H. T. Brewster, production coordinator; and A. H. Newland, service coordinator.

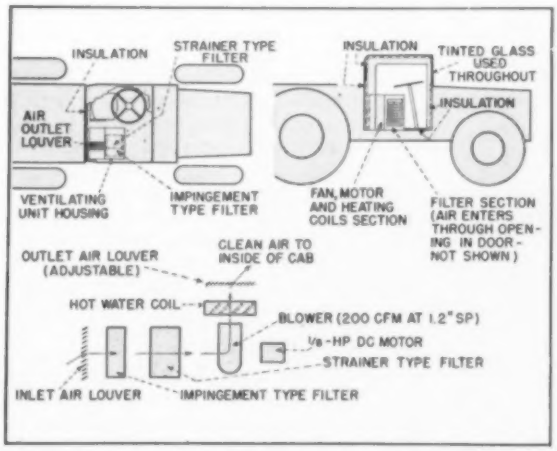


LARGER VENTILATING UNIT on electric shovel cab provides several changes of air per minute through duct work.

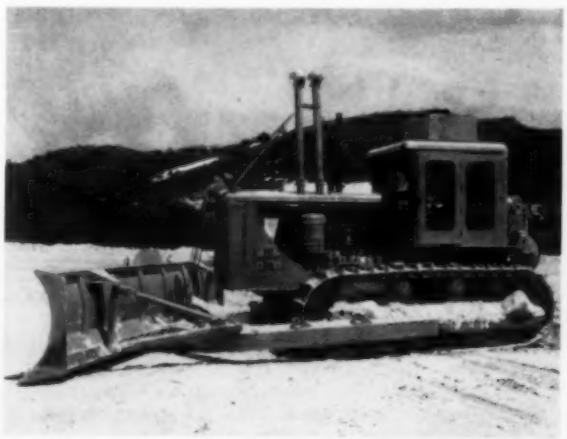
Ventilating Units Provide Safety, Comfort for Equipment Operators

DEVELOPMENT of specially designed ventilating units for use on earth-moving machines at the Johns-Manville open-pit diatomite mine at Lompoc, Calif., has added materially to the health, safety and comfort of equipment operators, according to an article by G. G. Schuknecht, assistant manager of the Lompoc operation, in the current (May, 1956) issue of *Engineering & Mining Journal*, a McGraw-Hill publication. As shown in the accompanying table, the installation of the ventilating units has resulted in lowering of dust counts from as high as 110 million particles per cu ft to a median of less than 5 mppcf.

Best of all in Johns-Manville's opinion, however, is the enthusiastic reception of the units by equipment operators. Without exception, the operators



HERE IS HOW a ventilating unit is installed in a haulage truck at open-pit operations of Johns-Manville in California.



FILTERING UNIT on top of bulldozer cab assures the operator of cool, dust-free comfort and improved visibility.

DUST COUNTS in the cabs of haulage trucks are reduced from as high as 54 million ppcf to as low as 2 mppcf.

EASY ACCESS to ventilating units helps keep maintenance down to 1.2 man-hr per month for each unit in use.

have expressed their appreciation of the clean air in the cabs and the added comfort and safety the ventilation has achieved. Driver visibility has been improved, eye injuries from dust practically eliminated and safety hazards due to reduced and impaired vision have been minimized.

In addition to solving its own problem, Johns-Manville believes the system may be applicable in other industries using similar equipment where dustiness is a problem.

STUDYING THE PROBLEM

In gathering data for determining the extent of the ventilation needed, the first step of Johns-Manville's engineers was to take extensive dust counts under every conceivable type of operating condition. The U. S. Public Health Service and the California Department of Public Health worked with company engineers in taking dust samples.

These dust counts ranged from 3.3 to 110.3 mppcf of 0.5 to 10 microns in size with median value of 16.7 mppcf. 95% of all dust counts were over 5 mppcf.

The company's objective was to lower median dust concentrations in the equipment cabs to less than 5 mppcf, maintain comfortable temperatures inside the cabs in both hot and cold weather, improve visibility and general working conditions for the equipment operators and reduce safety hazards.

At first, Johns-Manville engineers believed refrigeration would have to be included to keep the tightly closed cabs cool enough for operator comfort. This idea was abandoned soon after it was found that sufficient air movement in the cabs, combined with thermal resistant safety glass, provided operator comfort on even the warmest days. In addition, tops, sides, bottoms and fire walls of the cabs were insulated with a 1-in thickness of a Johns-Manville thermal insulation.

The engineering staff also had to come up with a design for a ventilating unit which would be compact enough to fit into the very limited cab area on most of the equipment and at the same time withstand the severe service to which earth moving equipment is generally subjected. Much attention was also given to designing a unit which would require a minimum of maintenance and would be readily accessible for that purpose.

After 4 years of trial and error experiment, the first satisfactory unit was installed and tested in 1953. The actual engineering work as performed by the Lompoc mine engineering staff and Johns-Manville's General Plant Engineering Department.

VENTILATION UNIT COMPONENTS

The final units, which more than fulfilled the requirements established, were developed and installed by Kilpatrick & Co., contracting engineers of Alhambra, Calif. Installation of the last of the 21 units was completed in 1955.

Components of the ventilating units finally installed are as follows:

Blowers, used on the trucks and bulldozers, are Buffalo Size C Baby Ventilation type which supply 200 cfm. Similar blowers, supplying up to 2,000 cfm, are used on the large shovels. The blowers are driven by Pierson-Frame No. 13, ⅛-hp, 1,750-rpm, 6-v DC motors.

Generators, Delco-Remy heavy duty 50 amp, 6v, DC, set with 200 amp-hr batteries were installed on each piece of equipment as auxiliary power units to supply independent power to drive the ventilation fans.

Air filtering is accomplished in two-stages. Primary filtering is through an American Air Filter Co. 12x24-in surface wire type filter, Model MW-4, impregnated with BA Viscosine oil. The secondary air filtering stage is through an American Air Filter Co. 12x24-in. surface paper filter No. PL-24 using 10-ply Type S Airmat paper. The in-cab fresh air outlet has a louvered directional control which has been found important to operator comfort.

Filtered air is supplied to the cabs with a slight positive pressure inside the cab (about ⅛-in water gage) so that outside dust or air does not get into the cab through any unsealed openings, although as much sealing as practical has been done.

Each ventilating unit provides from one to five complete air changes per minute in each cab, the variation depending upon the size of the cab and the normal conditions under which the individual piece of equipment is operated.

VENTILATION UNIT MAINTENANCE

To maintain the ventilating equipment with a minimum amount of downtime, a small service shop was built adjacent to the mining areas where spare filters for each unit and other supplies are kept. Each ventil-

ating unit is serviced in the field on the basis of 8 hr of operation.

A specially designed trailer is attached to the filter service pick-up truck. It is equipped with dust tight compartments for transporting spare filters and supplies. It also has a powerful vacuum cleaner so the service man can vacuum out the inside of cabs at the same time the filter is changed.

Filter units changed in the field are brought back to the service shop where they are steam cleaned and oil dipped and filter cloths changed, ready for reuse. Field servicing of the prime loaders is done during the lunch hour so no production time is lost.

It is important to thoroughly clean the equipment cabs daily during the field service, particularly the floor area. Operators occasionally need to get in and out of the cabs during the normal day and even reasonable diligence on the part of the operator in cleaning his shoes does not prevent a certain amount of dust being brought into the cab or coming in through the opened door.

Maintenance and upkeep of the ventilating units has averaged 1.2 man-hr per month for each piece of equipment with a total cost per month for labor and supplies of $27.80 per piece of mining equipment.

Approximately 80 man-hr were required to completely modify equipment cabs and install ventilation units. The 21 units cost a total of $51,682 or an average of $2,461 each, including all experimental and development work.

RESULTS BEYOND EXPECTATIONS

Results have exceeded expectations. Air within the cabs of all mining equipment was sampled in two stages following installation of the ventilating units. The first stage of the survey was made immediately after all units had been installed, but before sufficient operating and maintenance experience had been gained to eliminate all trouble points. The second stage was conducted after minor changes had been made in some of the filtering units and the maintenance program was firmly established.

In the first stage 39 counts were made—ranging from 1.0 to 12.7 mppcf with a median value of 3.7 mppcf and the dust particle size range of 0.5 to 10 microns. Only 23% of the counts were over 5 mppcf.

In the second stage 40 counts were made—ranging from 1.0 to 11.3 mppcf with a median value of 3.5 mppcf and the same particle size range that was observed during the first stage. The counts over 5 mppcf, however, amounted to only 12.5% during the second stage of the survey.

How Ventilation Reduced Dust Counts in Quarry Vehicle Cabs

(In million particles per cubic foot)

Equipment	Before Ventilation (a)	After Ventilation (b) 1st Stage	2nd Stage
BOTTOM DUMP TRUCKS			
No. 131	—	2.6	3.2—3.3
No. 132	19.5—20.3	1.0	3.9—4.0
No. 133	33.0—92.5	3.3	2.1—4.2
No. 134	4.5—8.4	3.3—3.7	4.0
No. 135	8.2—11.5	1.9	1.8—2.3
No. 136	6.0—67.9	1.2	1.7—3.0
No. 137	10.7—45.7	2.4—5.0	3.4
No. 138	**18.0**—37.9	2.0—8.4(c)	3.5—5.6
No. 139	—	3.0—4.4	3.0
No. 140	**8.0—12.0—13.8** **13.8—19.0—20.0** 26.3—54.4	2.4	2.0—4.1
BULLDOZERS			
No. F-4	16.7	Removed from service	
No. F-20	5.9—7.3—8.3 8.6—17.6—**22.0** **46.3**	Removed from service	
No. 21	7.5	5.4(d)—12.7(e)	2.8—3.5—4.0 5.3(g)—11.3(g)
No. 24	—	2.9—3.3—3.8 5.4(e)—7.8	4.3
No. F-25	110.3	Removed from service	
No. 26	6.6—31.0	1.5—3.0 3.3—6.1(e)	3.4
No. F-28	10.3—37.8	Removed from service	
No. 31	—	4.2—4.3—4.8 10.0(e)—8.6(f)	4.9
MOTOR GRADERS			
No. 23	7.7—11.6	2.1	1.0—2.0—7.4(g)
No. 28	10.9—14.2	Removed from service	
No. 30	—	1.8	3.7—3.8
MISCELLANEOUS			
Electric Shovel	3.3—36.2—52.1	—	1.9—2.2—4.5(g)
Diesel Shovel	16.8—29.6	—	1.2—2.2—4.6
Truck Crane	10.0	2.8—4.9(f) 5.8(f)	—
Truck Loader	12.5—22.4—38.3	2.2	2.0—3.2

(a) Counts in boldface taken by Johns-Manville; remainder by U. S. Public Health Service and California Department of Health.
(b) All counts after installation of ventilating units by Johns-Manville.
(c) Filter unit out of order.
(d) Sprung door on filter chamber—leaking air.
(e) Loose filter—leaking air.
(f) Filter used over 8 hours.
(g) More than usual amount of dirt in vehicl cab from operator's feet.
Before the second dust survey was made, items (c) and (f) were corrected.

Johns-Manville engineers are quick to point out that such satisfactory results were achieved through the active help and cooperation of the equipment operators. The operators were not only consulted frequently throughout the design period of the project by the engineers, but contributed many suggestions which were incorporated in the design of the ventilating units. These operator suggestions have helped achieve more efficient operation and reduced maintenance cost.

Mining equipment on which the ventilating units have been installed at Lompoc include ten bottom dump trucks; five bulldozers; two road graders; one electric shovel; one diesel shovel; one tow tractor; and one truck crane.

FINE FARMS . . . can be developed from unsightly spoil-bank ridges. Wheat above yielded 19 bushels to the acre. Clover was used as cover crop by Sherwood-Templeton Coal Co., Ind.

SPOIL-BANK GRADING at Sherwood-Templeton is done with bulldozer. Land here is now in clover.

Spoil-Bank Farm Profit

By VANCE SAPPENFIELD

BECAUSE A VETERAN COAL MINING MAN believed that spoil-banks of stripped-over lands and sterile farmlands containing coal reserves could be exploited to yield profitable farm produce, the Sherwood-Templeton Coal Co., Indianapolis, Ind., has developed a comparatively large and profitable farming business from what began as an agricultural sideline.

The veteran mining man was the late R. Hartley Sherwood, whose company had acquired some 3,000 unfertile Indiana acres for the coal reserves beneath them. At first Mr. Sherwood thought to return fertility only to the reserve acreage, but later included spoil-banks in his agriculture plans.

As a result Mr. Sherwood's son, Sam Sherwood, is today a coal company president who not only directs one of the biggest coal mining operations in Indiana, but also guides the operations of one of the largest total

Strip mine above is now clover pasture. Small drag is grading spoil-banks.

. . . FROM BARREN LAND

Lands Return In Indiana

farmland acreages in the state. In fact, Sam Sherwood, spurred by 100-bushel corn yields from once barren land, hopes to become 1956 "Corn King" of Indiana's Sullivan County.

Other coal companies in Indiana own farm acreages, but practically all of them rent their lands to tenants on a share-lease basis. The Ayrshire Collieries Corp., for example, share-leases several thousand acres in both Indiana and Illinois.

Full Time Farming

But Sherwood-Templeton employs a full-time farm manager and up to 25 farm hands on a full and part-time basis. The company farms more than 3,000 acres in Daviess, Greene and Sullivan Counties, Ind.

R. Hartley Sherwood, who was known as the father of strip-mine reforestation in Indiana, was a president of the Indiana Coal Producers Association, the fore-runner of the present Indiana Coal Operators Association.

The two associations were responsible in a large way for the fact that the 1951 Indiana state legislature passed amendments to its 1941 spoil-bank tree-planting law. The amendments provided that spoil-banks could be planted with farm crops, hay crops and grasses, and used for grazing as well as re-forestation.

Before revegetating the land, a coal operator is required to grade the tops of all unsightly ridges to a minimum width of 8 ft and to grade all "isolated peaks" to a minimum width of 15 ft. The new law also provided that adjacent to public highways the land must be graded to create "rolling topography."

More, Indiana operators are required by law to post a bond of $200 an acre for each acre affected by a stripping operation. They also are required to obtain a permit from the state, paying a fee of $100 to $500, depending upon the size of a mining operation. Each operator must revegetate an area equal to the area affected by a mining operation in a 12-month period.

Manager Selected

But, even before the grading amendment was approved by Indiana's legislature, the Sherwood-Templeton Co. had been conducting farming operations.

Its first step had been the selection of a farm manager. The man who was chosen was Thomas W. Higgins, once a specialist with Purdue University's School of Agriculture.

Born in Silver Lake, Ind., Mr. Higgins was graduated from Purdue in 1949 with a bachelor's degree in agriculture. After having worked for Purdue's Extension Div. two years, he was hired as assistant county agricultural agent in Elkhart County. The late Mr. Sherwood had been serving as a member of the board of trustees of Purdue when Mr. Higgins was appointed as the farm manager. Both men believed that only the latest methods and equipment should be used in the Sherwood - Templeton farms. (e.g. Before fertilizer is mixed with soil, the soil is carefully analyzed to see which type of fertilizer should be utilized). Other innovations also were tested. Sherwood-Templeton's farm at the former Maid Marian mine in Daviess County, for example, had the first "farrowing stalls" for sows and pigs in Indiana. The stalls were copies of models perfected at Iowa State College. Their use cuts down considerably on the loss of pigs which hog raisers usually expect to be crushed by brood sows.

Coal-Fired Dryer

The late Mr. Sherwood was also one of the originators of the Bituminous Coal Research Association. When his company started farming he suggested that the association build a coal-fired (rather than gas or oil) crop-dryer.

The dryer was one of the first in Indiana and is used each year to dry corn and small grain. Not one to allow a valuable piece of equipment to lie idle during the non-farming months, Mr. Higgins converts the heater of the dryer into a "furnace" to keep pigs and sows warm as toast. It uses stoker coal.

In the switch from mining to farming Maid Marian's buildings have also been converted. The mine garage is used for corn storage. The mine washroom is now a "pig nursery," with a capacity of 25 sows and litters of pigs. The office building is used as a "pre-starting nursery" (weaning room) for pigs and a Quonset-type warehouse is now a corn and feed storehouse.

At Maid Marian Mr. Higgins and his farmhands are using the newest mixtures of feed for their pigs and are getting some excellent results. The young pigs are fed a "pre-starting" ration that has been highly fortified with antibiotics and costs $340 a ton. After being fed the pre-starter for a week the pigs are put on a "starting ration" for another week. Then they are taken from the sows and weaned at the age of three weeks. This year

INDIANA LAW says strip operators must grade ridges to 8-ft width, isolated peaks to 15 ft. Here Ayrshire Collieries shovel strips as a dragline grades ridges near Staunton (Clay County), Ind.

the pigs are being weaned when they reach a weight of only 8 lb.

Since the pigs are taken from the sows at the age of three weeks, the sows are able to produce three litters of pigs and to be bred for a fourth litter within 12 months. Mr. Higgins says that the brood-sows do not experience the weight loss that is usually caused when they are required to "manufacture" milk for longer periods.

Profits

The Sherwood-Templeton Co. has been farming for enough years now to have its records prove that up-to-date farming methods not only improve soil, but also make money.

In 4 yr there has been only one in which check-plots have shown that the company's land near Hymera has failed to produce 100 bushels an acre or more. (This is the land that Sam Sherwood hopes will make him Sullivan County "Corn King").

Concrete proof that barren land can be returned to fertility is evident in another plot of ground, this one in southern Sullivan County.

In 1949, a good "crop year," this particular plot yielded such a small amount of corn that the crop was not harvested by its former owners. The land lay idle during most of 1950, then was sowed with wheat in the fall. But the return again was low: only 7 bushels an acre.

After the land was acquired by Sherwood-Templeton, Mr. Higgins and his workers spread lime on the plot at the rate of three tons an acre. A legume mixture was planted and the plot was used for pasture. The next year the company spread fertilizer on the plot at the rate of 800 lb an acre.

147-Bushel Yield

In 1952, official checkers of the Five Acre Corn Club checked the plot. It produced an average of 147.3 bushels an acre. Even in 1955, an unusually dry year in the area, the land showed a profit.

The Sherwood-Templeton farm holdings are separated into three farms: Sherwood-Templeton Farms, Stonefort Farms and Maid Marian Farms. The year 1954 was a rugged one for Mr. Higgins and the company's farming operations because of the dry weather. But even in 1955, another dry year, the farming business of the firm produced a profit.

Maid Marian Farms was the "child" of an idea by Byron Lunblad, former vice-president of Sherwood-Templeton. In earlier years, Mr. Lunblad had decided that the coal company should furnish all fertilizer to tenant-farmers to rebuild the fertility of the soil. The fertilizing plan worked so well that in the first year farmers increased their average corn yields from 35 bushels an acre to 70 bushels. Mr. Lunblad concluded that profitable farming operations were possible. As a result the corporation, Maid Marian Farms, was formed. Other acreages were added later. Meanwhile, according to Mr. Higgins, each plot of ground presents a separate problem. In one area the company is experimenting with "sub-soiling" to increase drainage and tilth in a "craw-fishy" type of hard loam. Mr. Higgins and his workers use a D-6 Caterpillar tractor with a sub-soiling attachment. A steel prong penetrates the ground to a depth of 24 in to break up the hardpan that underlies the surface. ("Cracks" appear 6 ft ahead when it's dry.)

Sub-Soil Fertilizing

The company is also experimenting with Birdsfoot trefoil to increase the porosity of the soil and is at work developing an attachment for the "sub-soiler" to distribute fertilizer in the earth at a depth of 24 in. Mr. Higgins and the company are now busy with the engineering factors of the attachment and hope to have it ready for use this season.

L. E. "Buck" Sawyer, director of reforestation of the Indiana Coal Operators Association in Terre Haute, plays an important part in assisting operators in their farming and reforestation programs.

Some stripper spoil-banks are suitable for planting trees, some are better suited for planting alfalfa, lespedeza, various other clovers, grazing crops or hay.

Sherwood-Templeton and other Indiana coal companies are attempting to learn which land should be used for trees and which is suitable for grazing and crop-farming. Coal companies have been planting trees on spoil-banks since well before 1925 and some of the trees are now large enough to cut for fence posts, mine props and pulpwood.

The law permitting operators to grade their stripped-over land and plant it in crops has opened new vistas and new opportunities for the mine operators.

Mr. Higgins and Mr. Sawyer believe that with continued experimentation, continued use of modern methods, modern equipment and improved seeds, former stripper spoil-banks cannot only become "things of beauty" but also lands that will return the operators a healthy profit.

CUTTING, DRILLING PROBLEMS SOLVED, PRODUCTION INCREASED 25%

with Kennametal* Cutter Bits and Drill Bits

THE PROBLEMS: One operator in Nicholas County, West Virginia had two problems, which together formed a serious production bottleneck: (1) *cutting*—a sulphur streak next to bottom slate has to be cut in order to maintain proper height for equipment used; (2) drilling—impurities in the coal above this sulphur streak also present "something of a problem."

SOLUTION: Kennametal U7R Cutter Bits were installed for cutting of the sulphur streak, and Kennametal DL-1⅞" Drill Bits are used for drilling.

RESULTS: After one year's operation with Kennametal bits, this coal operator showed an average increase of 5 places cut and drilled per shift, to a new average of 20 places, an increase of 33⅓%. Tonnage increase was from 475 tons to 650 tons of coal. Hole drilling time has been reduced from between one minute and one-and-a-half minutes to an average of 45 seconds each.

COMMENTS: Superintendent of the mine reports that the Kennametal "R" Type Cutter Bit "has proved that it will withstand shock and wear in severest cutting which we have at our mine." He explains that the high production increase is due to: (1) no need to spot cutter bits in the cutter chain; (2) faster drilling of 6 ft. holes; and (3) fewer drill bit changes.

No matter what your cutting or drilling problems are, you will find a Kennametal Bit to do the job fast, with low bit and maintenance cost, and long bit service. Discuss your problems with a Kennametal representative. Or write KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Registered Trademark

Ask about the Kennametal line of augers, pinning rods and accessories

INDUSTRY AND KENNAMETAL ...Partners in Progress

FOREMEN'S FORUM

Spring Remedies for Winter Troubles

Here are some Spring Housecleaning tasks you can schedule to correct the ravages of a hard winter. Taking these preventive maintenance steps on your property now will head off future complications.

WE'VE HAD A HARD WINTER and a late Spring, but we look forward (with fingers crossed) to more reasonable behavior of the elements in the month of May. If these expectations for better weather are fulfilled, supervisors have a good opportunity now to take inventory of the Winter's ravages and to plan the repairs that may be needed to insure highest efficiency in the months ahead.

Ice, frost-heave and excess moisture may have created situations that will continue to deteriorate into troublesome problems if early corrective action is not taken. Supervisors who have maintenance crews available can schedule the work in slack periods. All other bosses should report the need for such repairs to their superiors. Here is a list of repairs—in mines, cleaning plants and strippings—that may need attention at your property.

Bulging Blacktop—The lumps and bumps raised by frost action in a blacktop surface can only get worse under the constant pounding of heavy-duty trucks. An insignificant projection in the road surface can be converted into a teeth-rattling chuckhole in a very short time as wheel after heavy wheel soars off the lump to land crushingly on the surface beyond. It's mighty hard on truckwheel assemblies, and that is the No. 1 reason for repairing frost-heaved pavement as quickly as possible, whether the trucks belong to the coal company or to its treasured customers.

Rutted Roads—Right now the moisture content of the ground may be the optimum for crowning, ditching and generally shaping up dirt roads on the property. Further drying out as the time goes on will make it almost impossible to remove ruts satisfactorily. With a little bit of moisture present in the ground, the normal traffic on such a road will effectively bind the surface after grading is done, which is something that won't occur on an excessively dry road.

Icy Airshafts—Chunks of ice, hanging heavily in dark intake airshafts, can be real widowmakers when they break loose. Sometimes they hang on tenaciously until the warming trend in intake air is fairly far advanced. Such accumulations, falling away from the sides of a deep airshaft, can endanger the lives of company men working near the bottoms of the shafts. It is only prudent to inspect all airshafts for sneaky ice accumulations to eliminate this hazard and to provide more shaft area.

Weakened Dams—Fresh water supply dams or overflow weirs of settling ponds may have been subjected to a heavy battering by ice jams throughout the winter. It is good practice now to inspect these and to buttress the weaker ones to insure uninterrupted water supply in the first instance and to keep silt properly and legally confined in the second. It is less troublesome to repair now than to rebuild later.

Blocked Drains—Ice and snow accumulations around preparation plants usually entrap a large quantity of fines. This material can find its way into drains where it builds up into solid deposits as the ice and snow slowly melt away. Complications may result later on when the plant and its environs are washed down. Drains should be flushed or otherwise cleaned if it appears that such deposits have built up.

Spoil-Bank Slides—Excess water in your spoil banks—or in the highwall, for that matter—can lubricate the material to the point of sliding off and creating trouble. Lives may be endangered, equipment may be covered, drainage channels blocked, coal may be buried and so on. If an inspection of the job shows that slides might be imminent, officials should take steps to promote better drainage by cutting direct channels to natural drainage through spoil areas, by constructing diversion ditches along the highwall or by bleeding the highwall through horizontal drillholes.

Jammed Scales—Railroad and truck scales are subject to heavy accumulations of dirt and ice during the winter months. It is good practice to remove the platform now to clean out the scale pit. Put this on your housecleaning schedule as soon as you can.

Tired Heating Systems—Heating systems in preparation plants, shops and offices have been under heavy load for months. They should be cleaned and refurbished now because it will be harder to do next fall, and you may run into unforeseen troubles then. Eliminate the possibility of having a future emergency by taking action now.

Soggy Supplies—Open stacks of supplies may have been damaged by the weather. Within the limits of the manpower and time available to you, it would be worthwhile to turn over stacks of timber or lumber, replace the dunnage under the stacks, if necessary, and set aside damaged material. Also, supplies stored in out-of-the-way corners of buildings should be inspected because unsuspected leaks in the building may have admitted moisture.

Strained Power Lines—Contraction and expansion of conductors under the influence of temperature changes are a source of strains on power lines and poles. The weight of ice deposited by storms is an added complication. Run an inspection survey of all power lines and make the necessary repairs to poles, lines, insulators and control installations if damage or the threat of damage has appeared.

Easing the Foreman's Job

By ERNEST W. FAIR

AS EVERY FOREMAN or superintendent knows, his job has become more complicated and exacting than ever before. New business developments, more complex equipment and an increased pace of business have all contributed additional load to his chief chore of handling the personnel over whom he has been placed.

The less of a problem the foreman has in handling the men under his direction the more he can give to these new executive duties. Here are several suggestions on steps he can take to make his personnel problems easier to handle in day to day work procedure.

Share the facts about company problems with employees. The employee who understands these problems is always better equipped to work out details by himself or herself rather than needing the physical assistance of the foreman. In most instances this added burden can be completely eliminated if members of the staff are given this full and complete understanding of these specific company problems as they affect the work involved.

Discuss job problems with these employees. The nerve-shattering chore of again and again explaining a job problem or giving instructions on how it is to be handled can often be eliminated by a complete discussion of the problem with the employee at the very start.

Set an example they will want to follow. All of us, no matter in what position of business or life we find ourselves, look to leadership. Each foreman takes his cue from the executive of the company to whom he is directly responsible. The men and women who work under that foreman take their cue from him. If the example he sets contributes to accomplishment of chores and routines with ease he will have fewer problems in his own executive position.

Avoid prejudices against any one employee. This is the hardest battle every foreman has to face in his daily routine. We all have inherent standards and when someone jars these repeatedly we cannot help but be prejudiced against that individual. But when we exercise this prejudice we create antagonism from that man or woman and the spirit of co-operation is virtually destroyed. That is the least of the problem, however, for such obvious prejudice has a direct bearing on the work responsiveness of every other individual.

Maintain a favorable attitude toward the company. People do their jobs best when they harbor a friendly feeling for the firm by which they are employed. They need less supervision on the part of any foreman. There are fewer difficult situations for him to handle. Where any foreman talks to his staff about the company for which they work in an unfavorable manner he is building additional management problems for himself that should never exist.

Make certain credit is always given for a job well done. Take a lesson from the youngster in your own home and note how willing he or she is to do things when praised or patted on the head for any achievement, no matter how slight. We adults are no different. We are always willing to put forth extra effort when we know that effort will be recognized.

Help the individual employee to get ahead. Many years ago workers were content to stay in a given job once it was handed to them; they were satisfied merely to hold onto that job. Not so in our modern times. Today every employee in our organization has ambition and the desire to get ahead. He and she will put forth extra effort on the job now held if convinced that they are progressing upward rather than standing still. That extra effort will be put forth for any foreman who helps the men and women under him to move toward their goals.

Treat each employee as an individual. Where person-to-person feeling exists in any situation between employee and foreman there is always greater spirit, more desire to do that little extra and assured security which helps to make the whole operation one that brings results. Where the foreman fails to handle each man or woman as an individual such spirit seldom exists; none of us, when we feel that we are only cogs in the company machine, have a free desire to do any more than required to hold onto our jobs until we can find better ones.

Be careful not to hurt the employee's pride. Pride is a powerful drive in many things we do during our business life. That pride is particularly important in any situations where we work with many other individuals. When the foreman does anything that hurts this pride the employee not only feels resentment against him but assumes a cloak of combat against his or her fellow workers . . . a situation which hardly creates harmonious working conditions that will result in less management problems for any foreman.

Accept suggestions freely and let it be known they are always welcome. We can never know when any employee (who is, we must remember, always closer to the actual work than we are) will come up with some idea that will materially lessen our own management load. Where the foreman maintains an aloof attitude and has always discouraged such suggestions from the people under him no one will bother to think such short cuts out on his own initiative. And when the individual does run across something he generally keeps it to himself for past experience has taught him there will only be cool rebuff if he dares to approach his foreman with the idea.

Get all of the facts before discipline. When things go very wrong and particularly when something happens suddenly and unexpectedly it is very easy to pour forth invective and discipline right on the spot. Our possession of management responsibility calls for complete elimination of what is known as "blowing one's top." Discipline, particularly, should be expended only after the whole thing has been thought out with great care and we have obtained all of the facts. Imposing discipline on an employee whom everyone knows was not really to blame for what happened (but at first glance appeared to be to blame) can result in so thoroughly disorganizing the staff that the foreman will need all of his time for months ahead to rebuild the damage.

Avoid impressing the people on the staff with authority. It's always a big temptation to anyone to seek to impress others with authority. And it's a sure way to make one's management job more difficult. Practically every employee expects a degree of this authority over his actions and does not resent it. As long as this is an understood relationship he keeps this attitude. But where the foreman never lets him forget that authority he feels resentment that in time becomes bitter hatred. No smooth operating organization can exist where resentment and hatred toward the foreman are present even to the slightest degree.

By the Way . . .

It is not so much what we know as how we use what we know.

He that is good for making excuses is seldom good for anything else. (*Ben Franklin*)

Tomorrow's work is hard for many persons because they procrastinate today. Today is the best day in the year for today's work. (*Thomas Dreier*)

The kindness we mean to show tomorrow cures no headaches today.

There never will be any tomorrow for the man who wastes today.

—*Morton Messenger*

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...are many years of valuable experience in meeting the exacting requirements of the coal industry for explosives and detonating equipment. You can rely on AMERICAN for precision performance and efficient cooperation in solving any unusual blasting problems. Fast delivery is assured by conveniently located plants and magazines.

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High Explosives	Electric Blasting Caps
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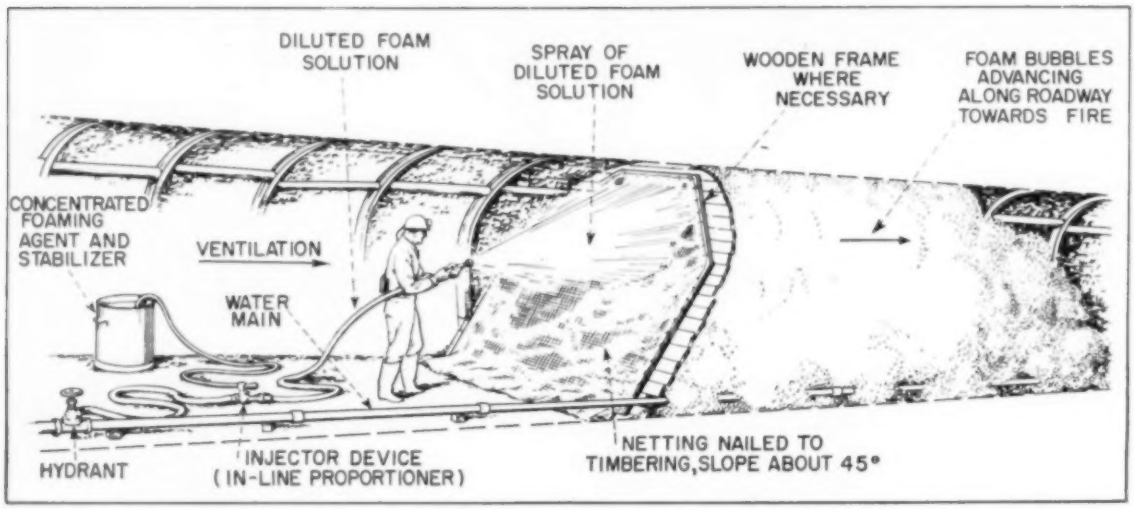
OPERATING IDEAS

This equipment used like this . . .

produces foam plug for fighting fires



FOAM PLUGS over 100 yd long have been successfully produced at all the common air velocities.

Traveling Foam Plug Quenches Fire

A NEW WAY to smother mine fires has been developed by Great Britain's Safety in Mines Research Establishment. Here's how it works. A bubble-foam plug generated on the intake side of a mine fire is pushed ahead by the ventilating current to smother the burning area. Experiments to date prove that the foam is successful in reaching fires up to 100 yd away in the headings where smoke or other obstacles would normally make them inaccessible to trained fire-fighting teams who are experienced in that work.

To test the effectiveness of the foam, a large fire was built in a tunnel and the temperature permitted to soar to 1,600 F before the bubble foam was released 85 yd away. Two minutes later, the temperature had dropped to 50 deg.

The bubble foam was formed by spraying water, to which had been added a foaming agent and stabilizer, onto a net stretched across the tunnel. The thick plug of foam which oozed out on the other side was carried to the fire by the normal ventilating current. As the foam advances it climbs over obstacles and expands into larger openings. If men are caught in it they can breathe fairly freely. Although the new method is still in the experimental stage and has not been tested in a real mine fire, it is said to be very promising.

Reinsulate with U. S. Uskorona and "D. R." Tapes

A cable becomes as good as new when you reinsulate with Uskorona and re-jacket with "D.R." splicing compound. The "D.R." compound provides an outside vulcanized covering. These completely reliable tapes give:

- Extra-tight grip plus high tensile strength.
- They stand up under acid, alkalies and moisture... ideal for mining machine cables.
- Dangerous leaks can't occur, because pinholes are impossible.
- Absolutely waterproof.

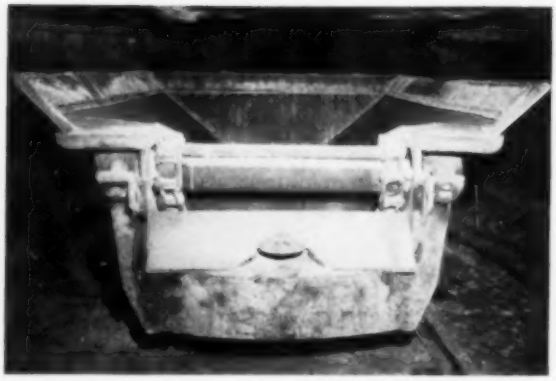
Like all the tapes and splicing compounds in United States Rubber Company's complete line, Uskorona was developed for specific operating conditions, yet can handle a wide range of electrical and general purpose jobs. It exceeds A.S.T.M. specifications.

Get in touch with any of our numerous distributors or one of our 27 District Sales Offices, or write to us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber



Remodeled Mine Car Distributes Track Ballast

DISTRIBUTION of ballast for mainline track is an easy job with this special car, which is in service at the Dana slope of the Amherst Coal Co., Rensford, W. Va. An all steel mine car used in driving a slope was modified by extending one bumper to provide a platform for an electric motor and speed reducer for driving a flight conveyor in the car. The original car was built by Jess Coen, former superintendent for the Hatfield Company. It was modified by Earl Spencer, electrician, at Amherst's Slage mine in Logan County, W. Va.

The interior of the car was altered so that a flight conveyor similar to that in a shuttle car could be placed in the bottom. Ballast is discharged over the end of the car as it is pulled over the track. Rock is unloaded much faster and easier with aid of the ballast car, the company reports.

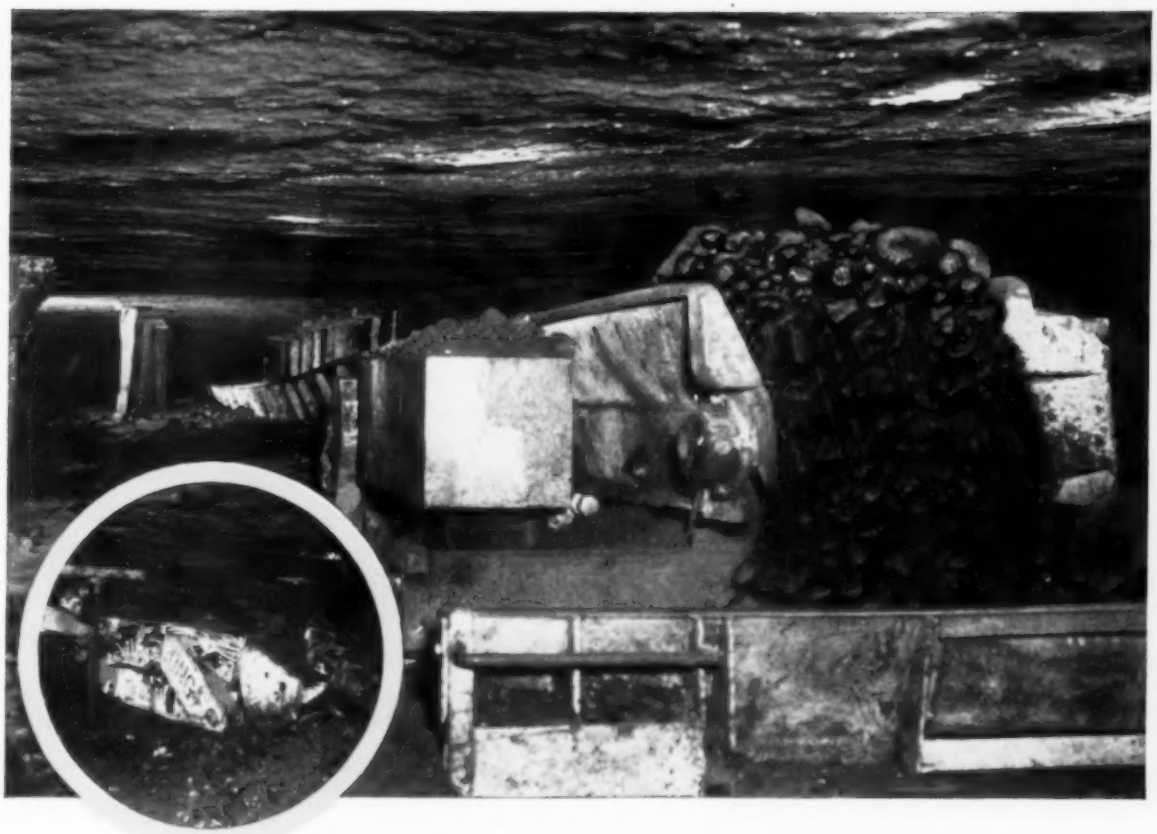
Individual Compartments Reduce Bit Losses

SIGNIFICANT SAVINGS in carbide cutting and drilling bits are achieved by close control over bit inventory. Each section foreman is assigned a bit compartment in a steel cabinet in the foremen's change room. A given number of bits are assigned to each section foreman who is also provided with a locked compartment in a steel cabinet. Located in the foremen's change room, the cabinet serves as a collecting and distributing center for bits. At the end of each shift, the foremen bring drill bits to the surface and lock them in the compartments. Individual groups are later picked up by the man assigned to bit sharpening, who has a master key for the compartments. After he completes the sharpening jobs, he returns each group to its respective compartment. As bits are worn out, they are replaced by the bit sharpener from the supply box on top of the foremen's boxes.

Greased Brake Rigging Lasts Longer

SMOOTHER BRAKING, longer life and easier replacement are benefits resulting from redesigned brake rigging at Consol 204. The company uses a number of G. E. 711 locomotives which are equipped with hydraulic brakes. In the past, as the brake linkage wore, the holes in the various parts became oblong. As a result, side play developed and the brakes couldn't be released properly.

To remedy this trouble, the company decided to use bronze bushings in the linkage and grease the connections. This was made possible by drilling each part and installing a grease fitting for each connection. The company says that the new greased linkage lasts at least 12 mo and one locomotive can be fitted with new bushings in one manshift. The old linkage wore out in 6 mo and it took 3 manshifts to make a new assembly and install it.

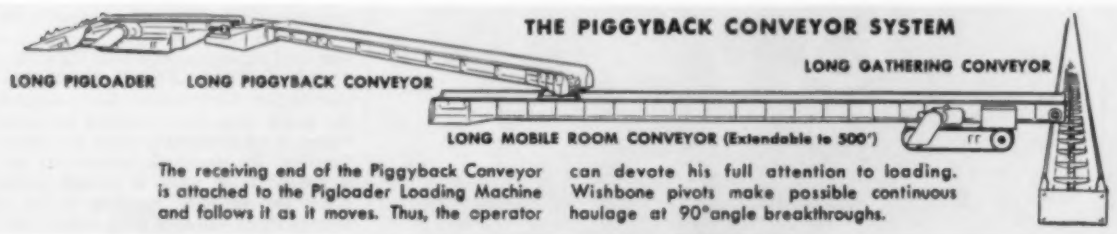


Up to 75% loading time per shift with PIGGYBACK Continuous Haulage Mining

By providing continuous haulage, the LONG Piggyback* Conveyor System delivers a steady, constant flow of material outby of the face area. The loading machine never has to wait for transportation—its rated capacity can be utilized throughout the entire loading cycle. As a result, with low-investment, low-maintenance Piggyback Mining, six hours or more loading time per shift is not unusual.

Every day more and more companies are learning that this exclusive LONG development pays off in higher total tonnages, more tons per man, and lower operating costs—regardless of seam height. What's more, the capital investment for the Piggyback System is much lower than for any other mining method. We'll be glad to supply facts and figures—without obligation.

*Trade Mark

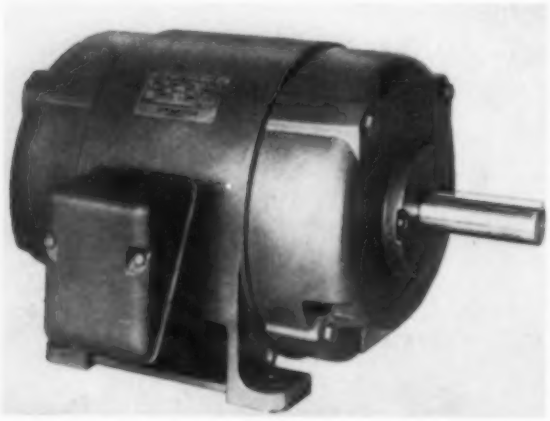


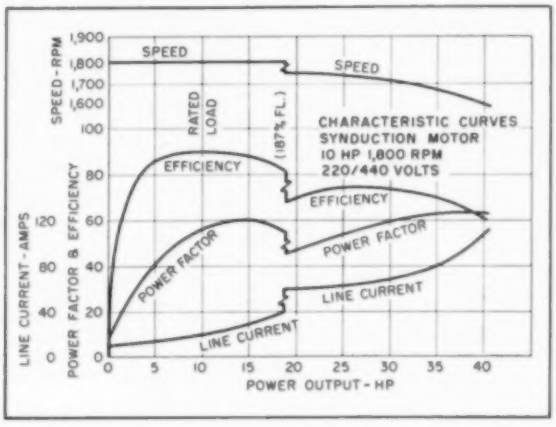
The receiving end of the Piggyback Conveyor is attached to the Pigloader Loading Machine and follows it as it moves. Thus, the operator can devote his full attention to loading. Wishbone pivots make possible continuous haulage at 90°angle breakthroughs.

For complete details or a demonstration, write us today!

The LONG Company
OAK HILL W VA

EQUIPMENT NEWS





Synchronous, Induction Motors Combined To Produce Hybrid

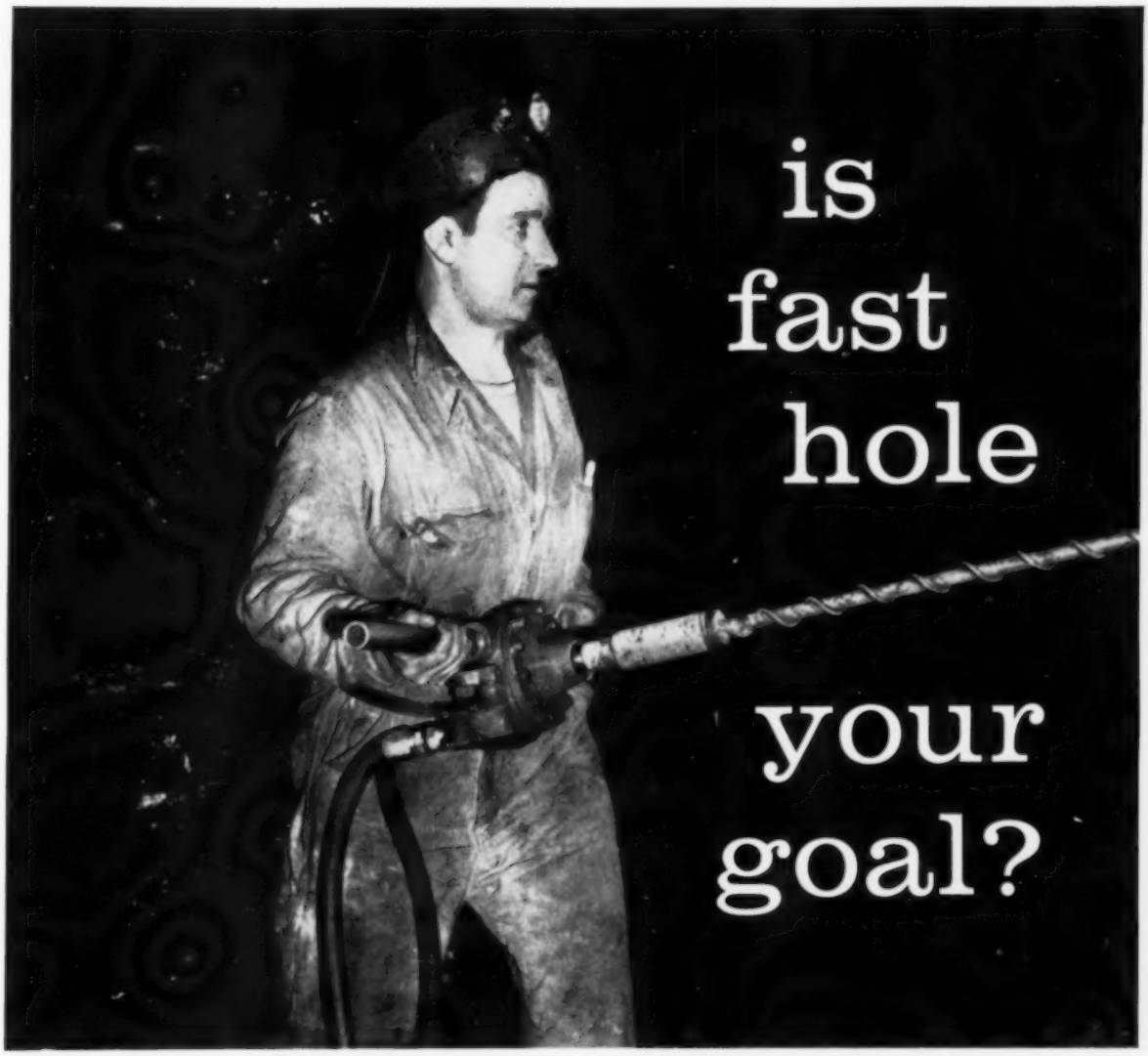
By combining the major characteristics of the synchronous motor (constant speed) and the induction motor (mainly a rugged-built rotor) Allis-Chalmers Mfg. Co. (Norwood Works) has produced a hybrid that it calls the "Synduction" motor. Constructed in ratings from ¼ hp to 40 hp, the motor is built on standard induction motor frames and enclosures, uses a simple die-cast rotor. Unlike synchronous motors the "Synduction" machine requires no brushes, slip rings or rotor windings, no DC excitation source or special starting equipment. The company says the motor approaches the efficiency and power factor of squirrel cage units. It starts as an induction motor with a very high locked-rotor torque, accelerates and pulls into synchronism quickly. Its high (175% to 200%) pull-out torque holds the motor in synchronism regardless of load or line voltage fluctuations, according to Allis-Chalmers. Standard across-the-line starting equipment is required.

Since the "Synduction" motor is not being constructed on an assembly line basis (the company is engineering it for individual applications), inquiries must include inertia information, accelerating time requirements, electrical supply, speed range and required enclosure. Allis-Chalmers Mfg. Co., Industries Group, Milwaukee 1, Wis.

Insulation Monitor Forecasts Ground Defects

An instrument that measures the effectiveness of insulations and will shut down a machine if insulation resistance falls below a predetermined level is being manufactured by the National Mine Service Co., Beckley, W. Va. Named the "Ground Sentinel," the instrument was developed to protect mobile off-track mining equipment from electrification by continuously monitoring for ground faults.

As a self-contained unit housed in a cast steel explosion-proof case (12 x 7½ x 7¼ in), the "Ground Sentinel" will forecast the fact that insulation has weakened, the maker says, since complete insulation failure is not required to cause the unit to function. Its electrical components are: a ground fault relay, a control circuit relay, two selenium rectifiers to act as voltage check valves, a reset switch and a test switch in series to which a resistor and a Thermistor are connected. The "Ground Sentinel" meets the United States Bureau of Mines requirements for off-track machine protection (Schedule 2F), according to information supplied by the manufacturer.



Get a CP Hydraulic Coal Drill!

SAFE AND EASY TO HANDLE

- NO SPARKS
- NO SHOCKS
- NO KICK OR STALL

You just can't beat the lightweight CP-35-HCD Hydraulic Coal Drill for fast hole drilling . . . *it drills 9 foot holes every 30 seconds in hard seams!* Its high torque motor delivers the power bonus and has the response needed for hard drilling in tough seams.

And more! The auger runs at optimum speed to minimize vibration and make long lengths of auger easy to hold. The CP-35-HCD can be run from the power system of cutting, timbering or roof bolting machines. A complete line of accessory equipment . . . valves, gauges, junction blocks, hoses and fittings is available. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

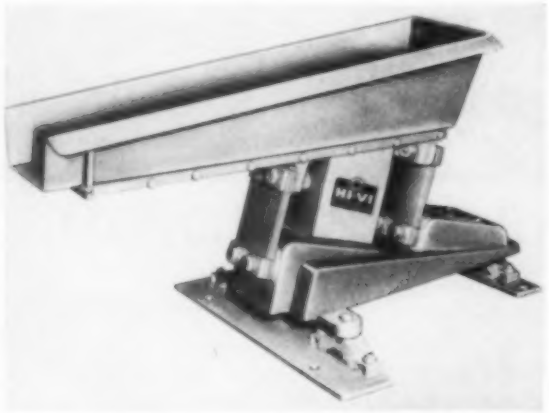
Dragline Boom Whip Seen Whipped

Single deck construction, a more rigid boom, a V-type horizontal diesel and forced feed lubrication are among the important changes of the new dragline (Models 721, 728, 728) being made by Page Engineering Co., Clearing PO, Chicago, Ill. The draglines' booms are fitted with Becket staffs and are also supported by cables at three equally spaced points. The result is a rigid, trussed boom, says Page, that reduces bending stresses and virtually eliminates whipping. The upper portion of the Becket staff removes sag from the main boom support lines and reduces boom deflection 75%, says Page. Basically, the new diesel consists of two banks of horizontal cylinders mounted one above the other. Close-coupled V-type construction eliminates heavy bearings and a shorter crankshaft permits more horsepower. A single pump lubricates all working parts. As an example of maintenance ease Page says that bearings, crankshaft, gears can be removed without disturbing cylinder heads.

¾ Yd Excavator Simplified

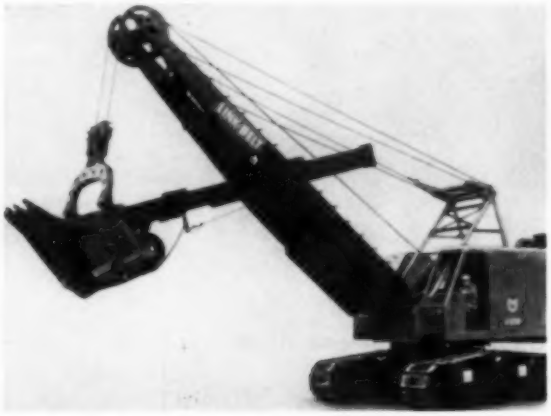
Koehring Co., Milwaukee 16, Wis., is producing a companion model excavator in the ¾ cu yd class that is similar in basic design to the company's ½ and 1 cu yd excavators. Named the Model 305, the ¾ cu yd machine has a rated lift crane capacity of 25 tons on a truck chassis, 15 tons on a crawler mounting.

Koehring officials say upper machinery has been simplified and contains only two major horizontal shafts. An all-welded turntable has been equipped with integral sidestands and main cross shafts revolve in antifriction bearings. In addition the model has self-cleaning crawlers, automatic traction brakes, a newly designed cab and operating lever arrangement and a mechanical cam type booster clutch on the main drum clutches. A hoe attachment for the 305 provides increased digging depth to 20 ft and modified line speeds increase hoe productivity by 10%. Side cutters are used to widen a trench or to dress an excavation the manufacturer says.



Low Power Input Feeder

An electro-permanent magnetic vibratory feeder, the "Hi-Vi," operates on 115 v or 230 v AC and has been built with what the manufacturer says is an exclusive electro-permanent magnetic drive that delivers higher vibratory output with lower power input and eliminates bearings and friction-producing parts. The maker, Eriez Mfg. Co., Erie, Pa., says that feed rate is flexibly controlled by the "Hi-Vi's" remote controller, which contains no rectifier, but only a rheostat to vary the voltage across the unit. An enclosed drive combines an electro-magnet with a permanent magnetic armature to utilize the principle of magnetic attraction and repulsion between poles. To the resulting oscillation is added the force of two steel springs between which the drive element is mounted. In tests three models, the FE-2, FE-4 and FE-10, moved two, four and ten tons of sand an hour.



3-Yd Shovel-Crane Has 75-Ton Lift

Link-Belt Speeder Corp.'s largest (3 cu yd) production model shovel-crane, the K-608, converts to shovel, crane, dragline, clamshell and piledriver. The machine has a rated crane lifting capacity of 75 tons at a 12-ft radius and features "Speed-o-Matic," a system of control in which an engine-driven hydraulic pump delivers pressure to clutches. Pressure is metered by variable valves that are lever-controlled by the operator. The K-608's power equipment consists of a torque converter and engine matched for horsepower. An independent, positive chain crowd offers two crowding speeds and boom angle changes are permitted without chain adjustment. A rigid track driver assembly has been designed to hold the chain sprocket and track drive sprocket in alignment at all times. Multiple-hinged shoes have been designed with a short pitch. Cedar Rapids, Ia.

B.F.Goodrich

PENNSYLVANIA coal hauler gets 6,000 hours' service from BFG tires.

VIRGINIA miner reports BFG tires can be recapped where others failed.

MINNESOTA iron miner finds BFG tires defy chunks of abrasive rock.

KANSAS miner uses BFG tires to pull 80-ton "hopper cars" out of pits.

These miners save money with BFG tires —here's how you can, too!

A PENNSYLVANIA coal stripper reports B. F. Goodrich Universal tires have given 6,000 hours of service, including recaps. Tire trouble at a Virginia mine used to stop production, run up costs. Then the company switched to BFG tires, now reports their tire problems licked. On a Minnesota ore road or pulling out of a Kansas open pit, B. F. Goodrich tires defy dangerous rock cuts.

These reports are typical of what mine operators all over the country find: B. F. Goodrich tires wear longer and reduce operating costs. Extra-thick tread on the Universal resists cuts and bruises. And under the tread is the B. F. Goodrich *all-nylon* cord body.

Nylon is stronger than ordinary cord materials, withstands double the impact and defies heat blowouts and flex breaks. That's why the B. F. Goodrich *all-nylon* cord body outwears even an extra-thick tread, *can still be recapped over and over.*

Your B. F. Goodrich retailer has a tire for every kind of mine work. Let him show you the one that will wear longer and save you money. Or write *B. F. Goodrich Tire & Equipment Company, a Division of The B. F. Goodrich Company, Akron 18, Ohio.*

Specify B. F. Goodrich tires when ordering new equipment

B.F.Goodrich
FIRST IN RUBBER

Your B. F. Goodrich retailer is listed under Tires in the Yellow Pages of your phone book

Drill Cores to 200 Ft

Mobile Drilling, Ind., 960 N. Pennsylvania St., Indianapolis, Ind., has introduced "Mobile Drill" Model B-40, a hydraulically-powered unit that has been designed and engineered to operate as a core or auger drill. Designed for adaptation to tractors to be driven by a motor mounted on the rear of any vehicle, the drill cores to 200 ft and augers to 75 ft. Either air or water may be used with hollow-stem augers. A 15-hp hydraulic motor is geared to high torque low speeds and is said to assure a positive, steady drilling action. Operated by one man the B-40 can be converted to drill at any degree.

Shovel, Crane Air Controls

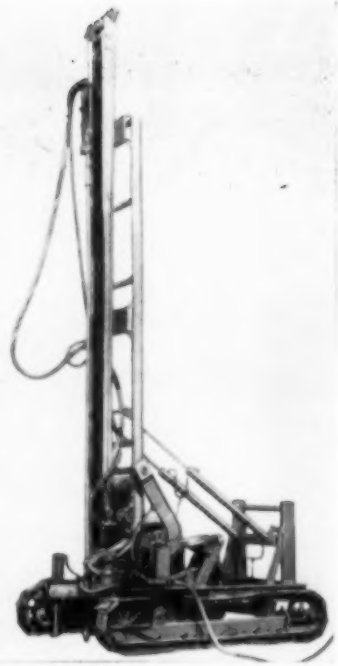
Air controls for eight Lorain power shovels and cranes (20 to 30 ton capacity) have been announced by the Thew Shovel Co., Lorain, Ohio, which describes the controls as "radically new." Named "Air-Ease," the controls operate all friction clutches by full-metered air power using only two levers (instead of the usual four, Thew points out). These operations are controlled, says the company: boom derricking, boom brake, swing, crowd, retract, hoist, clam holding, drag-in, power lowering and third drum. The travel of self-propelled rubber tire Lorains is also controlled by metered air. Thew points out that since there is only one lever for each hand to direct, hand switching by an operator is unnecessary. In what the company calls a "blending" operation, an operator, by moving a single lever, can combine either hoist and crowd, hoist and retract or swing and boom up. The so-called blending operation is possible because of a multiple air valve at each lever's base.

Crawlers' Power Boosted

International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill., has announced production of four models in its crawler tactor line, the TD-18, TD-14, TD-9 and TD-6. The principal engineering changes in the new models, according to the company's Industrial Power Div., are increased horsepower ratings in the TD-6, TD-9 and TD-14; cerametallic clutch facings; 500-hr tract roller seals; all-weather, positive, easy-starting conversion systems. The TD-6 crawler tractor is rated now at 41.5; the TD-9 crawler is being made with 54.5 drawbar hp and 66 belt hp; and the TD-14 has 78.5 drawbar hp and 89.5 belt hp. In the TD-18 the company has engineered it to produce 124 hp at 1,450 rpm and the drawbar pull is 24,300 lbs. Drawbar hp is 103 and moves the unit into the big crawler tractor class. The company's cerametallic clutch facing (all four models) is made of material similar to that used as brake linings on jet aircraft. Its heat-resistant characteristics, the company says, gives rapid engagement.

Tools Speed Belt Joining

Flexible Steel Lacing Co., Chicago, Ill., is manufacturing "Flexco Speed Tools," a line of products that have been designed to take the hard work out of joining and fastening "Flexco" fasteners or hinged belt fasteners. The company says the tools speed up fastening as much as 50%. A power tool wrench, for instance, when used with an electric or air impact tool, has been designed to speed nut tightening. The company's power tool boring bit, or boring punch, is designed to speed belt hole boring when used with an impact tool. The use of the tools and the use of the company's double purpose Templet, Alligator Wide Belt Cutter and "C" cartons of assembled bottom plates are expected to save downtime.



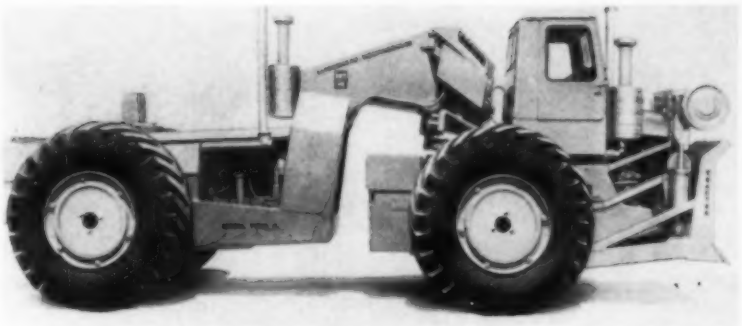
Drill, Compressor Team

Gardner-Denver Co., Quincy, Ill., has announced a team of heavy duty equipment, a Rotary 900 portable compressor that delivers 900 cfm and a 5½-in percussion rock drill (photo). The drill, Model DH143, is furnished with an air-powered crawler mounting that is self-propelled. It chain feed drilling mast accommodates 20-ft rod changes and can be hydraulically adjusted to drill toe holes at 15 deg below the horizontal. Bits from 3½ to 5 in can be used and Gardner-Denver has developed a special line of carburized section drill rods, couplings and shanks for the DH143. The unit will drill horizontal face holes as high as 8 ft above a floor and when set to drill at 10 deg above the horizontal, the bit enters the face at a height of 10 ft.

Gardner-Denver's compressor is a two-stage unit that operates normally at 100 psi. Its rotaries have a water-cooling system that permits full-capacity operation in extreme climates, the company says. A clutch disengages the compressor for engine starting, and water from the engine is circulated through tubes in the heat exchanger and oil reservoir to warm circulating oil.

Brake Permits Dual Drives

A through-shaft magnetic brake that incorporates the features of solenoid operation is being manufactured by Stearns Magnetic, Inc., Wilwaukee, Wis. Traded by the company as the HT-50 Through Shaft, the unit has been designed and engineered to permit the motor shaft to extend through the brake's center and out beyond the brake's end. The design, says Stearns, permits users to connect drives to both ends of the shaft.



Maker Claims 'Most Powerful' Title For Tractor

A 416-hp, two-engine tractor, the Model Twin-C, is said by its maker, LeTourneau-Westinghouse, Peoria, Ill., to be the most powerful tractor in the world. It weighs 40 tons, travels at 20 mph (5.8 in reverse) and on sandy clay has recorded a drawbar pull of 65,900 lb, the company says. Six-ft tires (29.5x29) support the Twin-C, which is designed to push-load self-propelled scrapers.

10-Yd Scraper Designed For Push-Loading

The scraper above is the CCS Wooldridge "Cobrette," a self-propelled machine equipped with fluid coupling drive, a hydraulic "Gear Steer" (90 deg turns) and a frame and power train that permit it to push-load another scraper. It's rated at 7.5 cu yd struck, 10 cu yd heaped. A 143-hp diesel produces speeds up to 30 mph on four 18:00x25 tires. Wooldridge Mfg. Div., Sunnyvale, Calif.

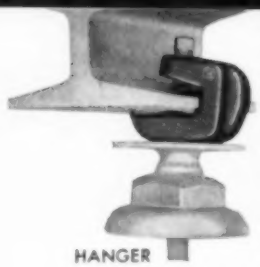
Torque Proportioning Assists Traction

A larger model "HO Payloader" tractor-shovel with a heaped capacity of 2¼ yd and a struck capacity of 1¾ yd had been announced by the Frank G. Hough Co., Libertyville, Ill. Equipped with a "no-stop" power-shift transmission and torque converter, the tractor-shovel also features torque-proportioning differentials to combat slipping wheels. When a wheel encounters poor traction its opposite receives up to 24% more power. What the company calls "pry out" bucket action and the tractor-shovel's 40 deg breakout at ground level permit bigger loads. Other features: pressure-controlled hydraulic system; power-steering; four-wheel hydraulic power brakes; planetary axles.

(*Continued p. 102*)

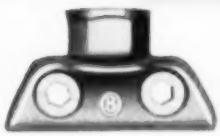
INSULATED HANGERS

1



HANGER ADAPTERS

2



TROLLEY WIRE CLAMPS

3

FEEDER SLINGS

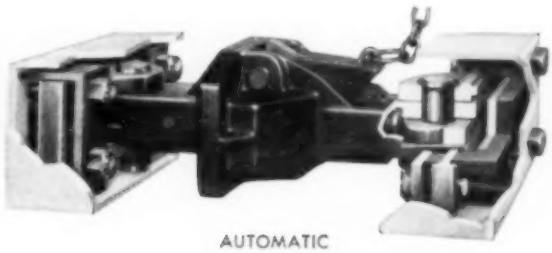
4

TROLLEY FROGS, CROSSOVERS

9

EXPANSION BOLTS

10



AUTOMATIC COUPLERS

11

Ohio Brass - First in

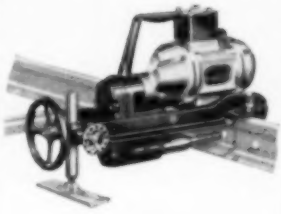
LOCOMOTIVE EQUIPMENT

LINE MATERIALS

RAIL BONDS

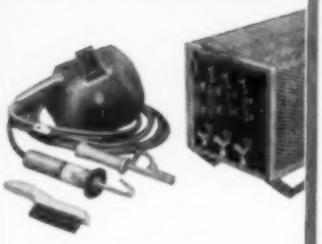
RAIL BONDS

15



RAIL DRILLS
(for wedge bonding)

16

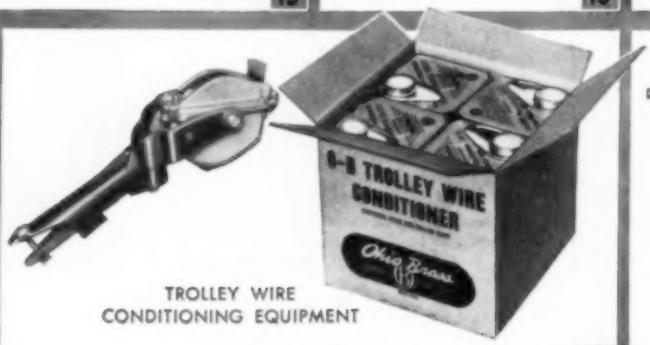


BOND WELDING EQUIPMENT

17

WHEEL COLLECTORS

19

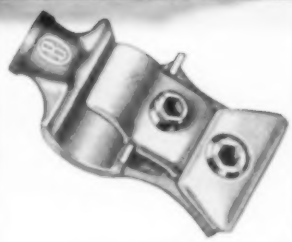


TROLLEY WIRE CONDITIONING EQUIPMENT

20

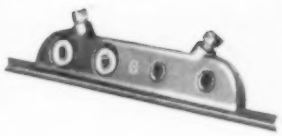
FUSED TAPS

21



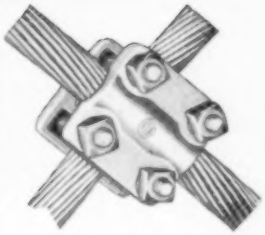
COMBINATION FEEDER-TROLLEY CLAMPS

5



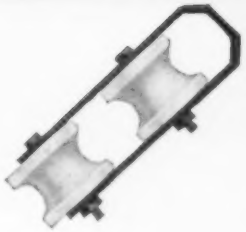
FEEDER AND TROLLEY SPLICERS

6



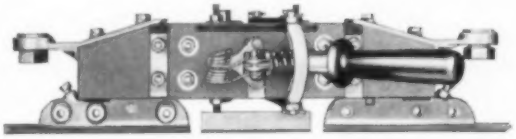
BRANCH CONNECTORS

7



PORCELAIN INSULATORS

8

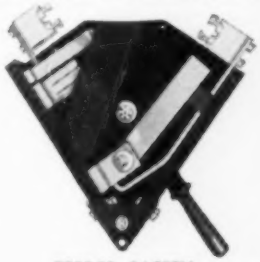


SECTION INSULATOR SWITCHES

12

QUICK-BREAK SWITCHES

13



FEEDER SAFETY SWITCHES
(cover removed)

14

Mine Haulage!

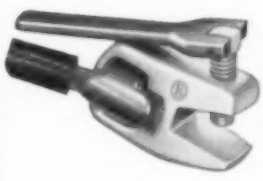
Ohio Brass is one of the world's largest suppliers of electrified mine haulage equipment — has been since before the turn of the century. That's why you can bring your mine haulage problem to O-B engineers and be sure of an efficient, economical solution—whether it's simply a recommendation for a new insulated hanger or a blueprint for a complete haulage system.

Use the handy coupon below to get the answers you're looking for.

AUTOMATIC COUPLERS — SAFETY AND CONTROL EQUIPMENT

SHOE COLLECTORS

18



RAIL CLAMPS

22

Let O-B mining engineers help solve your mine haulage problems. Just circle the appropriate number and clip the coupon for information about these products and how to use them.

OHIO BRASS COMPANY
MANSFIELD, OHIO

Name_____

Position_____

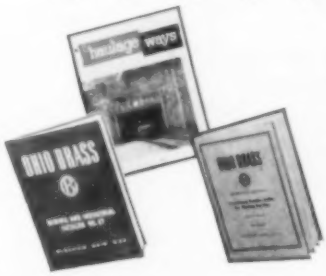
Address_____

_____

_____

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

16 17 18 19 20 21 22 Other_____



☐ **A Storehouse of Ideas** — O-B Mining and Industrial Catalog No. 27 is loaded with suggestions for more efficient haulage. Check the box to get your copy.

☐ **A Library of Information** — O-B Haulage Ways brings 8,000 mining men "how-to-do-it" articles and new product information every month. Just check the box to add your name to the list.

☐ **Aluminum Feeder Cable** — Supplement No. 1 to the O-B No. 27 Catalog lists O-B fittings for aluminum cable and describes correct installation procedures. Check box for your copy.

4707-M

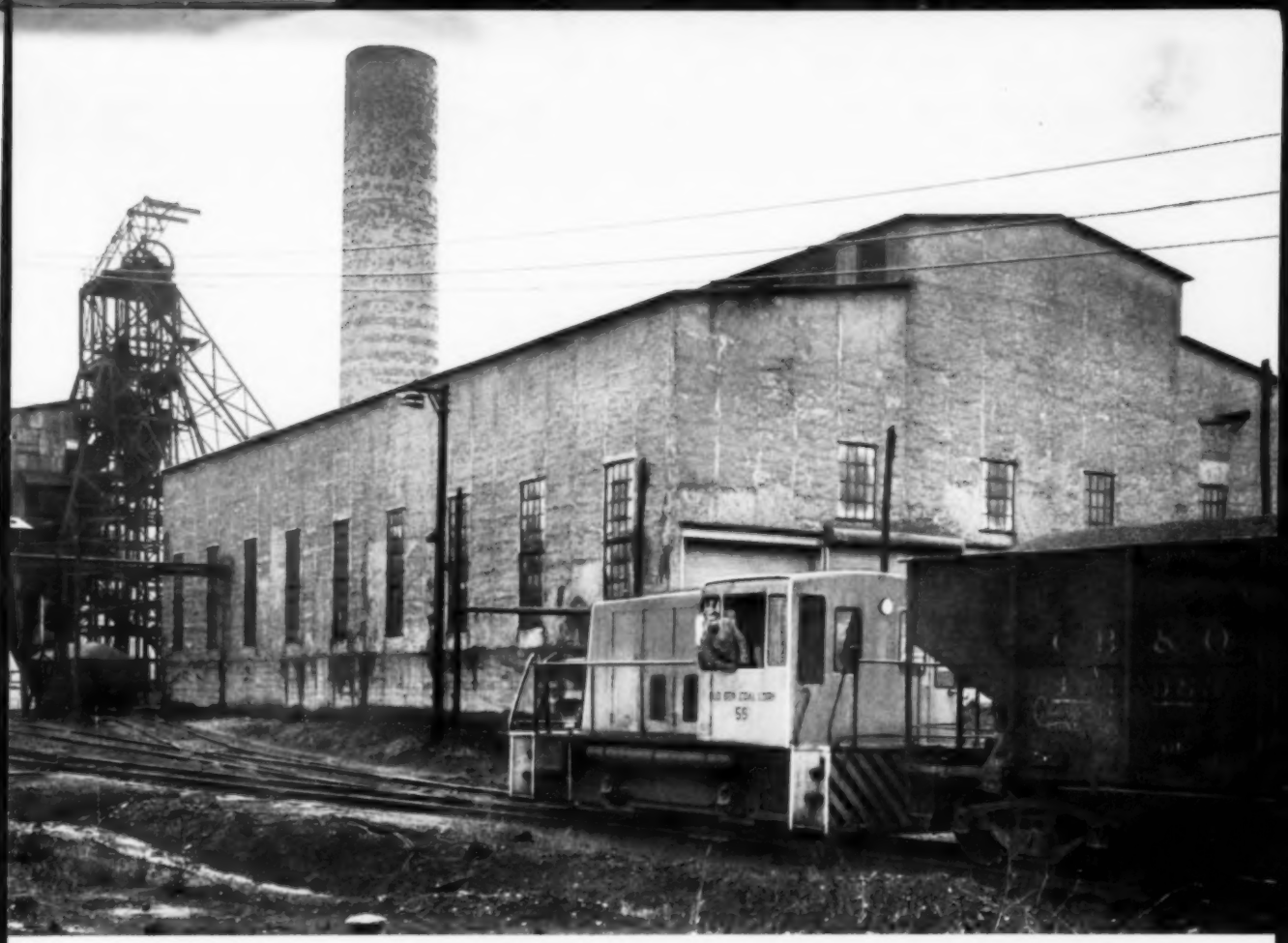
EQUIPMENT NEWS (from p 99)

Percussion Rock Drill Bits

A 6-in Rok-Master has been added to the percussion rock drill bit line of the Chicago Brunner & Lay Rock Bit Corp., 9300 King St., Franklin Park, Ill. The bit is for use on I-R Quarrymaster drills and features 2 x 3 A.P.I. threads. The manufacturer says its bit body is "super-tough" and its fast drilling carbide inserts have "unusual resistance to wear and shock."

Plastic-Insulated Motor

Lincoln Electric Co., Cleveland 17, Ohio, has re-entered the electric motor field with the introduction of a line of "Linc-Weld" motors. Available in standard sizes from 1 to 40 hp, the motors are said to be the first in this range of sizes with extruded plastic insulation. The line is built in the open type frame and torque design B. Lincoln Electric says the models comply with NEMA specifications. The plastic insulation, unlike conventional varnish insulation, is molded into and around stator windings. (The stator is placed in a die and the plastic forced in under heat and pressure.) According to Lincoln, the motor has performed longer than an enclosed motor, simply because of the plastic insulation. The company declares that the plastic will provide physical protection, too. Vibrations, often the cause of loose windings, cannot loosen, according to Lincoln, since they



G-E 35-ton Diesel-electric Locomotive Shuttles Million Gross-ton Miles a Year For Old Ben Coal Corporation

Push and pull . . . stop and go . . . shunt, shuttle and haul . . . over one million gross-ton miles a year!

Twenty hours a day a 35-ton G-E diesel-electric locomotive is working under these conditions for the Old Ben Coal Corporation at its West Frankfort, Illinois, mine. It handles everything from shunting and classifying empties, to humping fully loaded gondolas of processed coal to the load yard for pick-up by main line locomotives.

100% available during working hours, this locomotive is ready to go on a moment's notice. A push of the starter button and the job is under way. The 275 horsepower built into this powerful locomotive makes regular movement of 350-ton train loads a simple and routine matter. And, 1.5% grades are no chore because this diesel-electric has smooth, ready power.

Built with long life in mind, G-E diesel-electrics are designed specifically for industrial service. Simple, rugged electric drive with few wearing parts cuts maintenance costs. Dependability has been tested and proved in more than 2300 applications in every major industry.

YOUR PARTICULAR HAULAGE NEEDS CAN BE FILLED with one of the seven standard locomotive sizes, ranging from 25 to 95 tons.

For a survey of your locomotive requirements, without obligation, contact your local G-E Apparatus Sales Representative. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa.

120-82

You Get

Longer Life,

Better Performance,

Lower Cost

WITH ELECTRIC DRIVE!

GENERAL ELECTRIC

They built this track for tomorrow

Here's a mine that looked ahead, and liked what it saw: a steadily increasing demand for coal, with perhaps the billion-ton year but two decades away.

So they planned for their share of tomorrow's haul, and started from the ground up with a completely new haulage system. Curves, tangents, turnouts, crossings—all were built of heavy Bethlehem rail, to stand up under the heavy tonnages of up-to-the-minute mining.

They freely drew on the knowledge and experience of Bethlehem mine-track engineers, and they specified that turnouts be prefabricated in Bethlehem's shops before shipment of any materials to the site.

This is routine service for Bethlehem engineers, as you will discover if you talk over a haulage problem with them. You will do most of the talking at first, so that our men can gain the necessary insight into your operations. But once the problem is bracketed, our engineers will take it right off your shoulders. They will draw up plans for approval, prefabricate crossings and turnouts, see that all curves are of correct radii and all rails cut to length.

When the track materials arrive at your work-site, you'll find that everything fits to a T, with installation easy and waste eliminated. This is truly the easiest and most economical way to bring your haulage system up to tomorrow's requirements. The sooner you start, the sooner you're ready to cash in. A meeting can readily be arranged to fit your schedule, through our nearest office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

are anchored permanently to the stator frame.

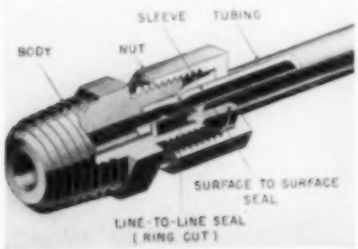
Three-Stage Converter

A 3-stage torque converter that provides two output arrangements has been announced by the Twin Disc Clutch Co., Hydraulic Div., Rockford, Ill. Named the 13,800 Series, the converter was designed specifically to accommodate engines for which previous models had not been ideally suited (Allis-Chalmers, Caterpillar, Cummins, Fairbanks, Gardner, Le Roi). Features: (1) a basic unit with easy-to-add components which produce 10 specific models—the arrangement is said to permit extreme flexibility and speedy interchange of components to produce a specific model; (2) 2 output arrangements; (3) 3 input arrangements; (4) a design to fit new SAE standard flywheels, accommodating Nos. 0 to 00 housing sizes. The converter can be adapted to all engines in the 60 to 600 hp range by internal blading variations, i.e., changing blade angle or varying the number of blades. Design includes a 6 to 1 torque multiplication at stall.

Pipe Patching Clamp

A tool that is said to repair pipe leaks quickly, permanently and economically has been introduced by Atlas Industries, Box 8152, Houston, Tex. Consisting of a pipe clamp and patches that have been shaped to fit specific pipe sizes, "Pipe Tool" is made in two styles: saddle type in four sizes for use on 6 in pipe and less; chain type in all sizes from 6 in up. Patches are steel with either neoprene or asbestos gaskets. Patches, however, can

be made of other specified materials. Without shutting off a line, the clamp is placed around a leaking pipe. The patch is applied directly over the leak and sufficient pressure is applied by the clamp to stop a leak. The patch can then be welded to the pipe or the clamp can be left on until it is convenient to weld. Where welding is prohibitive a cold-weld process can be employed. "Cold-Weld," the company says, can be applied as a cement to pipe and patch. In 24 to 48 hr the patch has become part of the pipe.



Self-Aligning Tube Fitting

The Weatherhead Co., Fort Wayne Div., Fort Wayne, Ind., has announced a selfaligning tube fitting that is being traded under the name "Selfalign." A major advantage, according to the company, is installation without disassembling the fitting. Tubing is simply inserted in the fitting until it bottoms and then the nut is tightened. The "Selfalign" is suitable for instrumentation and other low and medium pressure applications using copper and aluminum tubing. Manufactured in sizes ⅛, 3/16, ¼, 5/16, ⅜ and ½ in brass.

Small Diameter Well Pumps

A pumping unit designed for wells 4 and 6 in in diameter is being marketed by the Layne & Bowler Pump Co., 2943 Vail Ave., Los Angeles 22, Cal. Named the "Verti-Line Package-Pump," the unit is pre-engineered for ordering by unit

425 tons per shift — and this NEOPRENE belt comes back for more — year after year!

CRASHING IMPACT! As five more tons of coal roar down onto this neoprene conveyor belt in the Stonega Coke & Coal Company's Crossbrook No. 1 Mine. This one feeder conveyor handles 425 tons per shift . . . rough treatment to take day in and day out! But neoprene belting doesn't tear or chip under this brutal punishment. On the basis of performance to date, the company expects to get about ten years' duty from the belt.

Neoprene has the abrasion resistance that makes for long service life . . . saves big money on replacement. And neoprene won't support combustion . . . its flame resistance means greater mine safety. Next time you order conveyor belting, specify neoprene—the same tough material used to jacket mine trailing cable. Neoprene offers you **OUTSTANDING RESISTANCE TO ABRASION, FIRE, AGING, OIL AND GREASE.** Keep abreast of the latest neoprene developments . . . mail the coupon below today!

FREE! THE NEOPRENE NOTEBOOK. Every issue contains new illustrated case histories, interesting articles, new applications of neoprene. Clip and mail this coupon to E. I. du Pont de Nemours & Co. (Inc.), Elastomers Division CO-5, Wilmington 98, Delaware.

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division CO-5
Wilmington 98, Delaware

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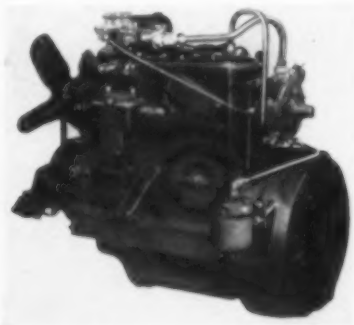
number and delivery as a complete package. Manufactured in horsepower sizes 2 to 7½; heads to 340 ft; and capacities from 200 to 7,500 gal an hr.



Choice of Gasoline or Gas

The Industrial Engine Dept., Willys Motors, Inc., Toledo, Ohio, has announced that liquid petroleum gas and natural gas conversions of "Jeep" L-head and F-head industrial engines are available as optional equipment. The company's engineering staff says that hard-faced stellite valve inserts, standard Willys water cooling of the manifold and an LPG carburetor make the "Jeep" engine satisfactory for burning propane or natural gas. The advantages, says Willys, lie in high octane at low costs. LPG octane rating is well over 100, according to the company, while premium gasoline is in the 80-plus class.

Plant Rated at 10,000 W

An air-cooled electric plant rated at 10,000 w is being manufactured by the United States Motors Corp., Oshkosh, Wis. A 4-cylinder, 4-cycle, V-block, 1,800 rpm engine drives the plant's generator. The unit weighs 730 lb, is 43 in long, 29 in high. It is constructed with standard voltage, single and 3-phase generators.

Gas, Vapor Detectors

Portable instruments designed to detect and to measure flammable gases and vapors have been introduced by Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa. Four models are available. Principal feature: 6-lb weight (compared to the 12-lb weight of earlier models). Operating power is supplied by eight flashlight size dry cells. Samples of atmosphere are drawn into the instrument by squeezing an aspirator bulb. The test

There's MORE rating selection available in Allis-Chalmers **MOTORS**

To meet mining needs...

Allis-Chalmers Offers Complete Line of Rib-Type MOTORS from 1 to 100 Hp

Allis-Chalmers, a pioneer in rib-type TEFC motor design, is the only leading manufacturer offering a complete line of these motors from 1 to 100 hp. The many cost-saving features of deep-rib construction can be applied in a variety of uses . . . both indoors and out.

Here's why these motors can cut mining costs:

MORE cooling surface — Rib-type design provides reserve cooling capacity in dirty locations.

MORE iron—Cast-iron frame and external parts assure rigidity and resistance to corrosion.

MORE copper — Allis-Chalmers greater use of copper increases electrical life.

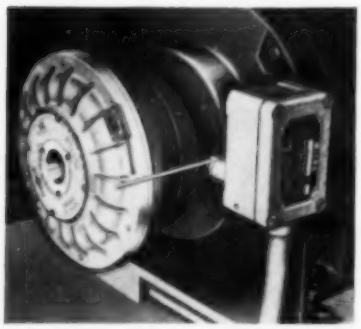
MORE lubrication provisions — Large grease reservoirs surround bearings. Provision made for in-service relubrication — important where moisture or corrosive vapors contaminate grease.

As a new machinery component or as replacement, specify Allis-Chalmers. To find out more, contact your nearby Allis-Chalmers distributor, district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4939

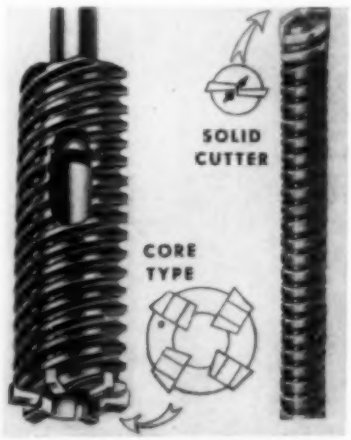
ALLIS-CHALMERS

for combustibility is done with a balanced Wheatstone Bridge circuit supplied with current by the batteries. Specially designed flame arrestors on both sides of the sample flow system permit use of the instrument in testing for all flammable gases and vapors, including hydrogen and acetylene.



Thermal Cutout For Drives

A device that adds thermal protection to the mechanical overload protection of "Flexidyne," Dodge Mfg. Co.'s dry fluid drive, is being marketed by Dodge, Mishawaka, Ind. With the device, (a thermal cutout) power is cut off if an overload causes prolonged slipping and heating. The cutout is recommended by the company for all unattended installations. Under installation conditions the cutout works this way: An alloy thermal pin which holds down a trigger spring melts before the "Flexidyne" can heat enough to cause damage. The melting permits the trigger to spring out to push the striker of a special switch to "off" position. By removing one screw, pushing back the trigger and inserting a new thermal pin, the device can be reset.



Solid Cutter, Core Drills

A total of 11 tungsten carbide-tipped machinery drills have been added to the "Proto" line of the Plomb Tool Co., Los Angeles, Calif. The drills are designed for high speeds and are turned by rotary electric and air. Six of the drills (3/16 in x ½ in holes) are the solid cutter type. They operate under light pressure. The

THIS RECORD SPEAKS FOR ITSELF!

4 years . . . and Not One Ton Lost due to tire failure!

U.S. ROYAL *Demountable* MINE CUSHION

Since 1952, shuttle cars equipped with the U. S. Royal Mine Cushion have moved upwards of 4 million tons of coal. Mine operators report this tire gives more than *double* service life, delivers increased shuttle-car speeds, makes possible higher operating profits. And there has been *not one* instance of a job stopped or a ton lost due to Mine Cushion deficiency—a record to remember if you're losing tonnage because of tire failure!

No other tire gives you all these features:

- **ADJUSTABLE CAR CLEARANCE**—your choice of six graduated diameters.

- **CUSHIONED RIDE**—superior to pneumatic mine tires at normal inflation.
- **DOUBLE SERVICE LIFE** proved in exhaustive comparison tests.
- **LESS DRAG** permitting 25% higher vehicle speeds, boosting production capacity.
- **HIGHER LOAD CAPACITY**—over 50% greater than comparable-size pneumatics.
- **PAYS FOR ITSELF**—changeover costs less than ¼ of what you may be losing with pneumatics.

For details, write J. C. Richardson, Industrial Tire Dept., United States Rubber, Rockefeller Center, New York 20, N. Y.

US RUBBER **United States Rubber**
Rockefeller Center, New York 20, N. Y.

remaining five (⅜ in to 1⅛ in holes) are the hollow core type. Three or more cutters drill the outside ring, leaving a core for removal. Multiple spirals are said to remove the dust efficiently.

Arc Welders Announced

Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. has introduced three arc welding machines, a DC rectifier, an AC/DC rectifier for metallic arc welding and an AC/DC "Heliwelder" for inert gas and metallic arc welding. Airco's DC arc welder ("Bumblebee") has selenium rectifiers designed for welding service to convert AC to DC. It features a single range of current adjustment. Airco's AC/DC "Bumblebee" is designed specifically for metallic arc welding and will supply either AC or DC. A control circuit eliminates mechanical control. Both AC and DC welding ranges are wide and a rheostat gives micrometer current control within each range of a 3-position switch. Both "Bumblebee" machines are made in 200, 300 and 400 amp. The "Heliwelder," produced in 200 and 300 amp models, can be used with inert gas arc welding processes and metallic arc welding. Consisting of a single-phase transformer, selenium rectifier and stabilizing reactor, the machine permits selection of either AC or DC. High frequency with rheostat control is built in.

Cabinet Adds Desk Space

General Electric Co., Electronics Park, Syracuse, N. Y., is marketing a two-way radio communication equipment cabinet for housing transmitter, receiver and power supply chassis at a fixed location. Named the "Desk Mate," the cabinet looks like a piece of office furniture and can be placed next to a desk. As high and as deep as an office desk, the cabinet is only 14 in wide. Thus, says GE, it will increase desk space rather than take up room on the top of a desk.

Heavy-Duty Fork Lift Truck

A 15,000-lb capacity dual-wheel drive, pneumatic-tire fork truck designed for heavy outside work is being produced by the Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich. Traded as the YL-150, the machine has a full-load speed of 20 mph, 30% gradeability and a lift speed of 50 ft a minute. Features: a gas engine of 282 cu in displacement; a design that places 50% of the machine's weight on the front axle. The YL-150, according to the maker, turns in 160-in radius and a swing length of 189 in. Uprights tilt 6 deg forward, 10 deg backward. Its one-piece forks are forged steel.

900 cfm At 100 Psi

Ingersoll Rand Co., 11 Broadway, New York 4, N. Y., has added a 900 cfm size to its line of "Gyro-Flo" rotary compressors. The addition increases the com-

We broke these truck axles in the lab...

In the INTERNATIONAL Engineering Laboratory, axle shafts are tested by twisting them back and forth—hundreds of times—at stress points far beyond those of any normal truck operation. Axle shafts are approved for manufacture only when they withstand a prescribed high number of twists. Production line axle shafts must conform to the quality standards set up by this rigid test.

to save you the BIG money!

Pictured above is a group of once fine and costly INTERNATIONAL axle shafts that have been purposely twisted and broken. This is done to make sure your INTERNATIONAL rear axle will last longer and save you the BIG money—the over-the-years operation and maintenance money.

This rigorous axle-twist test is but one of many operations in the chain of INTERNATIONAL engineering that makes INTERNATIONALS *all-truck*. There are no passenger car compromises *anywhere* in INTERNATIONAL design, no passenger car engines or components asked to do a truck job.

And beyond this big plus of all-truck design, INTERNATIONAL gives you functional, practical, money-saving styling—extra comfortable driver-saving cabs—every modern driving feature.

If you use a truck to make money, see your INTERNATIONAL Dealer or Branch and start saving the BIG money!

INTERNATIONAL HARVESTER COMPANY • CHICAGO

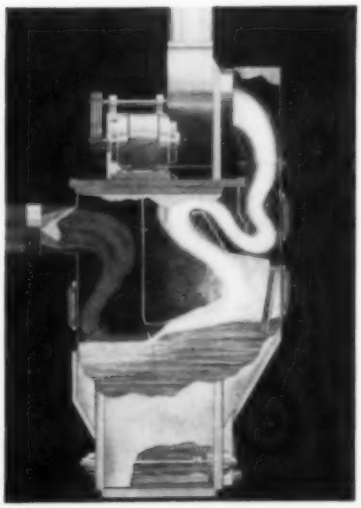
There are trucks for every mining and quarry hauling job, in the world's most complete line. GVW ratings from 4,200 lbs. to 90,000 lbs.—conventional and COE, 4-wheel and 6-wheel, four-wheel-drive models—in thousands of variations for exact job specialization.

INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Industrial Power
McCormick® Farm Equipment and Farmall® Tractors

pany's line to five sizes (125 cfm to 900 cfm). Weighing 14,340 lb, equipped with a GM 110 diesel (6 cylinders), the compressor will deliver 900 cfm at 100 psi and has the capacity to operate 10 jackhammers or seven wagonjacks, according to the company. Rated brake horsepower is maintained at high altitude, the company adds.



Dust Collector Introduced

A wet dust collector named the "Ventrijet" is said to achieve the proper atomizing of water and mixed air stream to permit efficient dust transfer. Manufactured by the Pangborn Corp., Hagerstown, Md., the machine collects dust-laden air within an inlet chamber where particles sink to the bottom of a tank as sludge. In another chamber the air is washed with water and emerges as clean air. The "Ventrijet" is made in capacities from 1,000 to 30,000 cfm.

Equipment Shorts

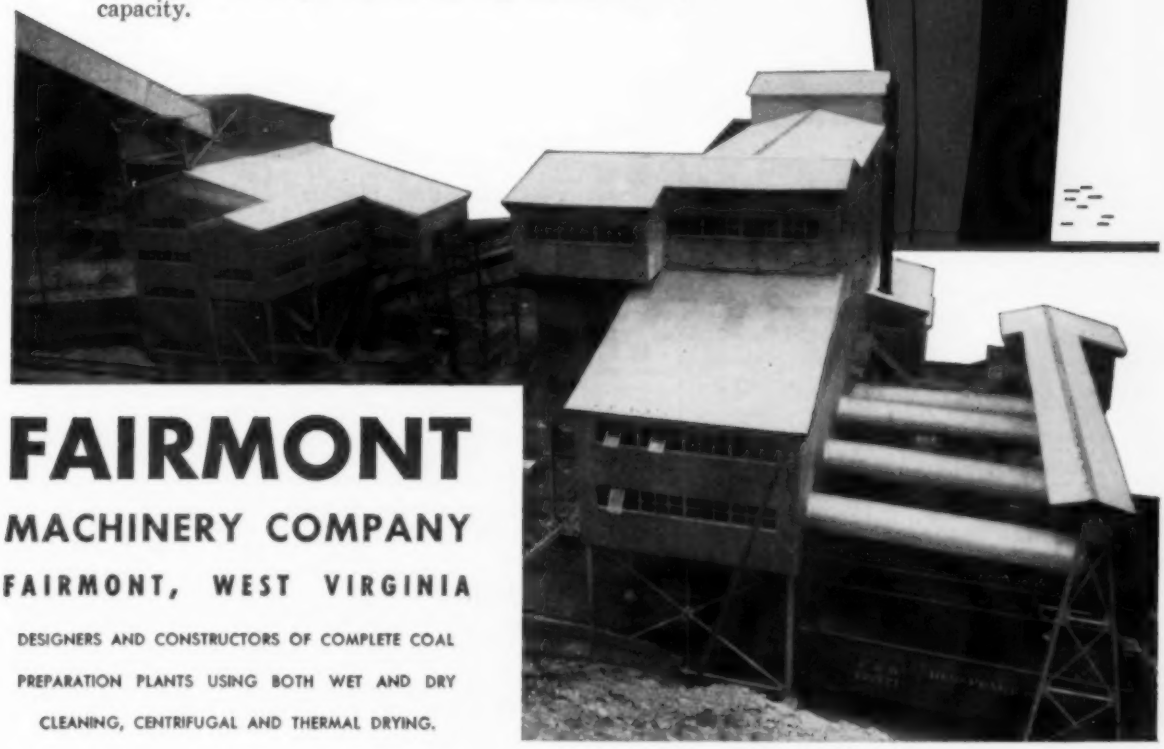
COAL ROOF BITS—Carmet, the cement-carbide making arm of Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa., has designed two new series of coal roof drill bits and auger bits. Increased steel support has been given the carbide tips, which are the TT style roof bits and the WW style coal drill bits. The TT series is made in 1⅜-, 1⅞-, 1½-in sizes. The point angle of the TT line has been increased. Carmet is making the WW tools with ⅝-in shanks and 1⅞- and 2-in sizes. Designed for hand-held drilling, the tools have been used in power-fed drills. Carbide has been relocated to give radical twist to cutting edges and the bit flute is designed to a wide smooth scoop.

FIXTURE-HANGER — An explosion proof dust tight flexible cushion fixture hanger designed to suport 65 lb is being marketed by Crouse-Hinds Co., Syracuse, N. Y. The action of the brass bellows is supplemented by a cushioning spring to

It's as simple as this! . . . just as sure as day follows night you can be certain that the coal producer who wants the best will, after careful study and comparison, select a FAIRMONT-designed plant. His operating experience, coupled with FAIRMONT'S engineering and building savvy will turn out a cleaner, more uniform product . . . one that will command a ready market at prevailing prices.

Operators who know their coal cleaning use FAIRMONT - built preparation plants

Call in a Fairmont engineer when you plan to build or modernize. Let him show you how you, too, can have a FAIRMONT-built preparation plant with over 99% separating efficiency through a wide size range in any tonnage capacity.



FAIRMONT
MACHINERY COMPANY
FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

permit movement of the fixture's stem to 15 deg from vertical in any direction. A screw locks the threaded stem in place.

GREASE CARTRIDGE — A factory packed grease cartridge designed to eliminate the work of filling from a pail or drum is being sold by the Tower Oil Co., 300 W. Washington St., Chicago 6, Ill. The cartridges can be loaded in a special inexpensive gun in 30 sec according to the Tower Co. The gun delivers 10,000 lb. of pressure.

IRON POWDER ELECTRODE—Hobart Bros. Co., Hobart Square, Troy, Ohio, is producing "Rocket 14," a new iron powder type electrode designed for AC or DC. The iron powder permits higher current welding and increases the rate of deposit over conventional E-6014 type electrodes. The company says weld bead is smooth, slag is easily removed and there is little splatter.

SQUARE TUBULAR BOOMS—An all-welded crane boom with main cords constructed of square tubes is being sold as standard equipment on nine Lorain crawlers and rubber-tired cranes. The construction drops 20 to 30% off the weight of the booms, according to the manufacturer, Thew Shovel Co., Lorain, Ohio. The company also claims a 15% increases in column strength per lineal foot over round tubes and 90% more than cords of angular cross section. The result, says Thew, is a reduced amount of column support lacing and a reduction in torsion resistance.

CONVEYOR SAFETY—An automatic safety controller designed to warn of abnormal load conditions on electrically driven conveyor systems is being manufactured by the Tipp Mfg. Co., Tipp City, Ohio. An electro-merchanical unit, the controller is called the "Tipp-Tronic." It is said to eliminate the need for shear pins, slip clutches and other mechanical safety devices.

TIRES—Cracked grooves and side sloppage are said to be nearly eliminated with the development of the "Super Fleetmaster," a tire designed by U. S. Rubber for heavy service equipment. The company, located at 1230 Sixth Ave., New York 20, N. Y., says a highly irregular groove pattern discourages groove cracking that leads to carcass failure with twice as many biting edges as other off-the-road tires. The company adds that lateral skid resistance is very high. A center control rib in the three-rib design is said to give excellent steering.

PRECISION LEVEL—Wild Heerbrugg Instruments, Inc., Port Washington, N. Y., is manufacturing the Wild Invar N-3 precision leveling staff which is said to have an accuracy of plus or minus 0.01 in in one mile of single leveling. The N-3's telescope, internally focused and with coated lens, has a magnification power of 42X. Centering is done with the standard Wild precision system in which bubble ends are brought to coincidence.

(Bulletins on p 118)

Steel arches "give" to make mining safer

The secret of safety in this ore drift lies in the Bethlehem Yieldable Arch sets which "give" instead of deforming under excessive load. The yielding feature is formed by over-lapping two adjoining nestable segments and fastening them together with heavy U-bolt clamps.

The tightness of the clamps controls the sliding action of the arch. Properly adjusted, the joints hold fast under normal loads. But when unusually heavy pressures begin to bear down, the joints yield before deformation of the steel can occur, permitting natural subsidence of the surrounding strata and redistribution of the load. The structural integrity of the arch is maintained and safety underground preserved.

There's real economy in these arches, too! First of all, thanks to their yieldability, they far outlive conventional timber supports and for this reason alone often pay for themselves within a year. And, on top of that, they are usually recoverable for re-installation elsewhere.

The Yieldable Arch is easy enough to install; no special tools or fancy equipment is needed. Your own men can set them up and take them down with only a minimum of technical supervision. Pictured above is the standard arch; you can also get Yieldable Rings or special shapes and sizes to meet your individual needs. One of our engineers will gladly give you full details.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Free Bulletins

ADHESIVES, COATINGS—Magic Chemical Co., 121 Crescent St., Brockton 2, Mass., is distributing a 25th anniversary edition of its catalog containing properties data of "Magic-Vulc" protective coatings and "Peerless" industrial adhesives. New produucts are listed.

SKID SHOVELS—Two folders, "Versatility Unlimited" and "Four-Machine Utility," give detailed operating features of the International Drott "Four-In-One" skid-shovels. Mechanical features of the "Four-In-One" are available for International's TD-6, TD-9 and TD-14 crawler tractors. International Harvester Co., Consumer Relations Dept., 180 N. Michigan, Chicago, Ill.

CONTROL, TRANSFER SWITCHES—Bulletin GEA-4746B, published by General Electric, Schenectady 5, N.Y., lists the company's complete line of control and transfer switches for low voltage applications up to 600 v, AC or DC. Describes watertight, explosion-proof types and others. Application data included.

BLAST HOLE DRILL—Ingersoll-Rand Co., Phillipsburg, N. J., offers a 32-p bulletin on the company's "Drillmaster," a 6½ in blast hole drill. Three types of mountings (crawler, truck and tractor) are covered and two pages give rock job estimating data.

COAL CLEANING—McNally Pittsburg's Bulletin 1155 gives detailed technical data on all the company's various coal cleaning processes. In it (40 pp) are described the McNally Tromp dense media process, the Mogul baum-type jig washer, the McNally Norton standard washer, Universal washer, single compartment unit, unit washery, Rheolaveur, McNally Brusset vacuum jig and the McNally Menzies cone washer. In Bulletin 855 the company itemizes its line of auxiliary equipment (bearings, takeups, holdbacks, chain, screen plates, pumps and valves) and includes specifications for conveyor and drive pulleys, V-belt sheaves, sprockets, gears, shafts and keys. McNally Pittsburg Mfg. Corp., Pittsburg, Kan.

PLASTIC COATED WIRE ROPE—Circular 5610, published by the Macwhyte Co., Kenosha, Wis., gives new specifications and information about plastic coated wire rope. Ropes with strengths from 480 to 7,000 lb, weighing from 13 to 153 lb per 1,000 ft, are shown.

ROLLER BEARINGS—Book 2658 contains a description of Link-Belt's self-aligning roller bearings. The contents cover Series S, adjustable single-row bearings; Series D, adjustable double-row bearings; and Series M, pre-adjusted double-row bearings: Link-Belt Co., Dept. PR, Prudential Plaza, Chicago, Ill.

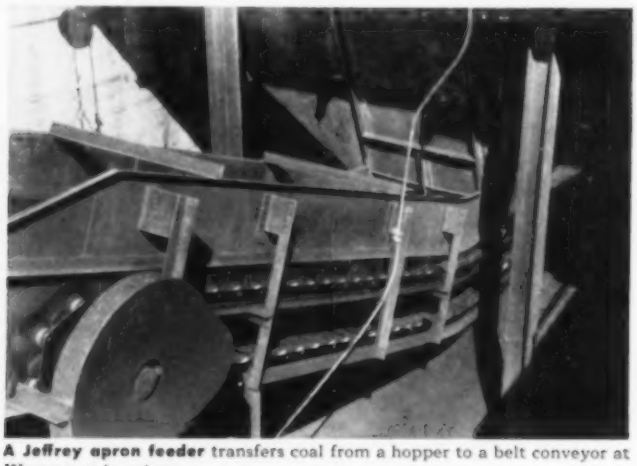
TRANSMISSIONS FILM—"Semi-Automatic Roadranger Transmission," a 16 mm sound and color film is being distributed by Fuller Mfg. Co., Transmission Div., Kalamazoo, Mich. A driver instruction film, the release illustrates operating principles of Models R-96, R-960, R-46 and R-1150, all semi-automatic "Roadranger" transmissions.

CENTRIFUGAL PUMPS—Dean Brothers Pumps, Inc., Indianapolis, Ind., describes its recently introduced line of seven standard centrifugal pumps in Circular 190. Only three parts (impeller, casing and back head cradle) vary with the size and capacity of the new line, which is named the GS series. Sizes: 1 x 2 in to 3 x 4 in. Pumping temperatures from —40 deg to 350 deg.

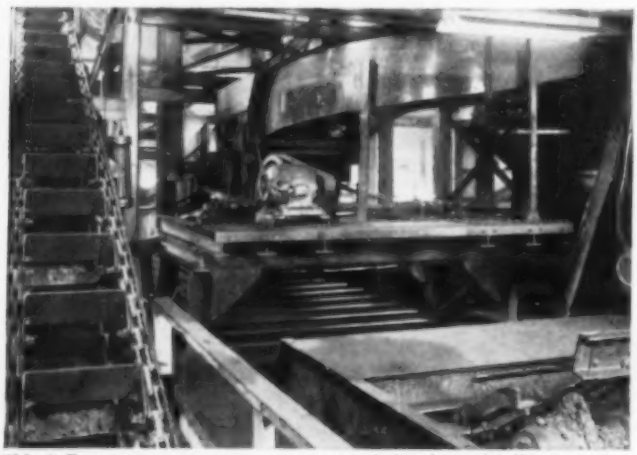
DOUBLE-ROLL CRUSHERS—An 8-p bulletin being distributed by McLanahan and Stone Corp., Hollidaysburg, Pa., contains information on McLanahan double roll crushers for finer reduction of medium size feeds. The bulletin features a table indicating sizes for basic components of the 25 crushers covered in its pages. Bulletin DR-256.

PORTABLE BUILDING—A folder published by United Steel Fabrications, Inc., Wooster, Ohio, shows nine different

Jeffrey belt conveyors carry coal to a Jeffrey Baum jig at a large West Virginia coal preparation plant.



A Jeffrey apron feeder transfers coal from a hopper to a belt conveyor at Western strip mine.



This Jeffrey scraper conveyor transports sludge from the jig at another West Virginia coal company.

For every coal handling job there's a

JEFFREY CONVEYOR or FEEDER

Efficient handling of coal in the preparation plant enables you to utilize washing facilities to obtain maximum production. Jeffrey has a complete range of feeders and conveyors to answer any handling problem at your coal preparation plant.

If any or all of your handling operations need modernization, let Jeffrey engineers consider your problem. For information on coal handling equipment to give you most efficient operation, get in touch with The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

variations of the standard USF "Handy-Hut," a portable all-steel building. USF's clip and wedge method of erection (no screws or bolts) is illustrated.

INTER-FLOOR TRANSPORTING—Bulletin 07B6878B, published by Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis., features the company's belt lift for carrying men or supplies. Requiring less space than an elevator or stairwell, the lift will unload packaged materials automatically, according to the bulletin. Safety measures and costs ($.20 to $.50 a day depending on height) are given.

WEATHER PROTECTED MOTORS—Construction features of Allis-Chalmers weather protected motors for outdoor installation are published in Bulletin 05B7874B. Motors are available in commonly used ratings, horizontal and vertical, 250 hp and up. 968 S. 70th St., Milwaukee, Wis.

VIBRATING SCREEN—Allis-Chalmers vibrating screen (Model S) in sizes up to 4 by 10 ft (one, two or three decks) for handling coal up to 6 in is the subject of Bulletin 07B8229. All-bolted, lock-nut construction and close-spaced clamping bar bolts and springs to prevent whipping and screen cloth breakage are described. An enlarged eccentric shaft offset between bearings provides a major portion of throw. Balance of throw is provided by small counterweighted wheels, according to the bulletin. 968 S. 70th St., Milwaukee, Wis.

WELDING—"Picture Book of Facts on Eutectic's Welding Processes" (TIS 2367) is available from Technical Information Service, Eutectic Welding Alloys Corp., 40-40 172 St., Flushing 58, N. Y. The booklet gives information on the "Low Heat Input" metal-joining process, which is said to combine low application heats of brazing with strength of fusion welding.

RECORDING, CONTROLLING INSTRUMENTS—Bulletin P1245A covers electronic potentiometer and bridge instruments for recording and controlling as manufactured by The Bristol Co., Waterbury 20, Conn. Single and multiple variable recorders are listed as well as a new high-speed recorder.

ASBESTOS CEMENT PIPE—Johns-Manville's brochure, "Transite Mine Service Pipe with Ring-Tite Coupling," explains how the company manufactures the pipe and suggests several uses. Case histories are given and a detailed explanation of the "Ring-Tite" coupling is featured. Johns-Manville, 22 E. 40 St., New York 16, N. Y.

SCREENING — "Wissco-loy Space Screens" are the subject of a 4-p illustrated booklet being distributed by the Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., 575 Madison Ave., New York 21, N. Y. The screens are manufactured with a special alloy and are fabricated with specified area separations for standard, special and non-standard equipment, according to the booklet.

ELECTRIC PLANTS — Automatic and manual starting electric plants (5 kw to 250 kw) powered by internal combustion engines are described in Bulletin 955, published by the manufacturer, International Fermont Machinery Co., Inc., Ramapo, N. Y. "Engineered Kilowatts" includes in its text selection factors and installation data.

INSULATIONS—A 20-p catalog being distributed by Johns-Manville, 22 E. 40 St., New York 16, N. Y., lists information on composition, physical and thermal properties and sizes of insulations and refractories. Materials for the control of temperatures from —400 deg to 3,000 deg are described. Title: "Johns-Manville Insulations."

RUST PREVENTION—Uses of "Rust-Oleum" as a rust preventative are illustrated with the help of 102 color chips in a new general catalog published by the Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill. Listed are primers, oil type coatings, oil field finishes, machinery and implement colors, heat and chemical resistant coatings, floor and deck coatings.

CATERPILLAR

SAXTON MOVES 560-TON DRAGLINE 7 MILES IN 7 DAYS

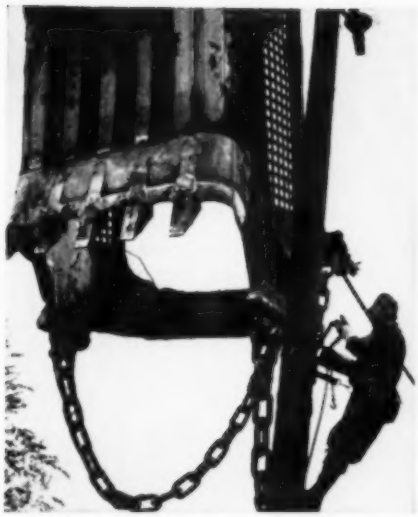
Thousands of dollars and hundreds of hours saved by use of two CAT* Mobile Electric Sets, powering it on a rugged trek across highways, railroads, utility lines, swampy bottom land and a 50-foot river!

Power to move this 560-ton dragline seven miles cross country was supplied by two Cat D397 Mobile Electric Sets. The journey continued round the clock, ceasing at night only when roads, railroads or power lines were met.

With its strip mine in Somerville, Indiana, exhausted, the Saxton Coal Company decided to move to a new area near Oakland City, seven miles away. This posed many problems. One of the biggest was how to transfer its 560-ton Marion electric 7400 walking dragline.

Three methods were available: (1) Disassembling the unit and then reassembling it at the new area. This would cost about $60,000 and take three months. (2) Using utility power, which meant erecting lines, taking them down and erecting them again. This would cost about $45,000 and take thirty days. (3) Using mobile power. This would cost about $30,000 and take less time.

Saxton officials decided upon the third method. For power, they chose two Caterpillar* D397 Portable Electric Sets with a combined output of 630 KW. Then they negotiated for passage across private property, power lines, railroads and highways.



Preparing to lift a power line pole out of the way. A total of five power lines had to be crossed.

Crossing bottom land, a D7 clears off the top layer of sod to prevent balling of sod in front of the dragline tub. Usually a 100-foot swath was 'dozed for passage.

Crossing State Highway No. 64, a D7 helps the dragline prepare a protective bed of earth five feet deep. Dragline in rear, along with another D7, does necessary restoration to terrain.

Cat D397 Mobile Electric Set moving up. Dragline traveled 2000 ft. between electric set moves.

Along with the two D397s, Saxton used two Cat D7 Tractors with Bulldozers and a Bucyrus Erie 15B dragline. Depending on the need, the 'dozers cleared land ahead of the 560-ton giant, replaced damaged terrain and handled other earthmoving chores. Great care was taken all along the route to leave the areas crossed in good condition.

Two power cables, each 1000 feet long, were used to walk the dragline. This allowed the unit to travel 2000 feet before the Cat Mobile Electric Sets had to unhook and move. They were reset 1000 feet beyond the dragline. The dragline averaged 400 feet an hour in good going.

Whenever possible, the dragline traveled around the clock, except in crossing highways, railroads or power lines. In all, a total of seven roads, five power lines and three railroads were crossed, plus pipe lines, water lines and a river.

Crossing the South Fork of the Patoka river, about 50 feet wide and 12 feet deep, presented the greatest risk. Although the flow is not swift, there is the threat of torrents from heavy rains.

Instead of laying tubes in the river bottom, a diversion canal was built. To allow the dragline to cross, about 3000 cubic yards of dirt were dug by the dragline itself and compacted by the 'dozers. After crossing, the dragline cleared the channel. Meanwhile, the rugged D7s were clearing land ahead.

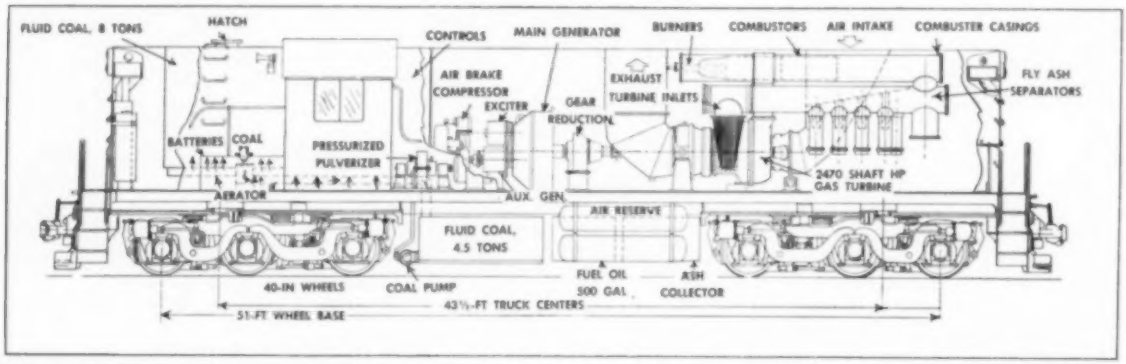
Good weather held during the journey, which required seven working days. Considering the length of the route and the hazards met, the operation progressed well. Said Bernard Youngs, vice president of Saxton Coal Company, Petersburg, "Mobile power is the way to move one of these machines."

Throughout the rugged trek, the Caterpillar units delivered the typical reliable performance expected of them. With electric sets up to 315 KW, there's a range of power suitable for all types of jobs. All Cat Electric Sets are backed by prompt service from the Caterpillar Dealer, who will be glad to furnish complete details about them.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U. S. A.

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NEWS ROUND-UP



ONE OF THREE studies on locomotive arrangements being directed by the Bituminous Coal Research Locomotive Development Committee—Proposal 1 (above) is intended to show that an existing gas turbine (English Electric Co. EM 27 P) can replace a 2,250-hp diesel engine, and that the necessary coal can be carried in a tank in the underframe and on the locomotive proper. This would permit re-rating the locomotive up to 2,500 hp, says P. R. Broadley, LDC director. LDC's other two proposals are concerned with 3,600- and 7,200-hp locomotives.

Fuel Tests Give Coal $49,000 Edge

Less than a decade ago when the diesel's steady roar had replaced the intermittent grunt of the steam locomotive, the new sound meant different things to different people. For some it meant only that the countryside had been robbed of an agreeable echo. For others, like oil men, the sound meant a new, rich and big market had opened up. For coal men the sound was a distasteful reminder that the railroads had stopped buying a huge 100 million tons of coal annually.

Last month in Columbus, Ohio, coal again cocked an eye in the direction of its strayed customer with the declaration that a potential $49,000 a year could be saved by replacing a diesel oil-fueled locomotive with one equipped with a coal-fired gas turbine. The declaration came from P. R. Broadley, director of Locomotive Development for Bituminous Coal Research, Inc., who told a BCR convention audience that bituminous Btu cost had been 20c a million during full-size tests in Dunkirk, N.Y., while fuel oil and lubricating oil costs had been 83c a million Btus during the same tests.

Backing the declaration of cost savings with a raft of statistics, Mr. Broadley said that in 1955 the Locomotive Development Committee's gas turbine test plant had accumulated 1,412 hr of coal-fired operation in 83 days. Some 4,111,400 hp-hr were generated at an average load of 2,894 hp. The research team had burned 2,250 tons of bituminous and no lubricating oil had been added during the tests. The value of coal, including railroad handling charges and a 1955 mine wage increase was $11,300.

Locomotive diesel engines, Mr. Broadley reported, would burn about 256,000 gal of fuel oil doing the same job. Allowing 6% of the fuel cost for lubricating oil, the total cost would be $28,745, he said. The saving due to the use of bituminous coal at 20c a million Btus instead of diesel oil at 83c a million approximates $17,450, he said. "In a locomotive year of 4,000 operating hours, the savings in fuel and lubricating oil costs would be about $49,000," he concluded.

LDC research has been directed toward three locomotive arrangements: (1) replacing diesels in existing locomotives; (2) utilizing the 3,600-hp Allis-Chalmers turbine or (3) utilizing the 7,200-hp AC turbine.

In This Section

Improper Blasting Blamed In Jamison Disaster

On Nov. 13, 1954 a blast so violent that it was recorded as an earth tremor 17 mi away, rocked the No. 9 mine of the Jamison Coal & Coke Co. near Farmington, W. Va. Fifteen miners working underground and one man on the surface were killed. At 10:30 P.M. that night the second explosion occurred. Another followed a few minutes before 4:00 A.M., Nov. 15th, and a fourth soon after.

Last month, after many months of intensive investigation, the Bureau of Mines said that improper blasting set off the series of explosions and issued a formal report. No. 9 employed 443 men and produced an average of 6,000 tpd. The blast occurred on a Saturday when few men are on duty. The report said: "Federal investigators are of the opinion that the explosion resulted from firing, in a nonpermissible manner, two or more charges of explosives in an explosive mixture of methane and air and that either the flame of the explosives or an electric arc produced by short circuiting of the blasting wires was the igniting agent."

The investigators also commented that coal dust, raised into a cloud by the blast, was ignited and entered into the initial explosion and this explosion was propagated throughout a great part of the mine and to surface openings by gas and coal dust.

During the investigation, officials located the place where the first explosion apparently was caused by a blast being fired from the mine's power circuit in an

explosive atmosphere. Although permissible explosives were used, their safety factor is lost if used improperly, the report explains.

The mine is rated "gassy" by the West Virginia Department of Mines and by the Federal Bureau of Mines because it liberates large quantities of methane. Faulty ventilation in a comparatively large caved area adjacent to the origin of ignition is believed to have filled it with methane gas.

Above-average quantities of rock dust were used to neutralize coal dust but investigators reported that much of the rock dust had been spread on the floor to form a layer one to several inches deep, instead of being distributed over the roof, ribs and floor. The "blanket rock-dusting" failed to form an effective barrier against the spread of an explosion, they said.

"The apparent ease with which the explosion traveled through the blanket rock-dusted areas shows that excessive rock dust on the floor in parts of an entry will not compensate for rock-dust deficiencies in other parts of the entry, especially when excessive coal dust is present," the report continues. "Loose coal and coal dust 3 to 8 in in depth had been left along the greater part of the ribs of advancing entries, and larger amounts of loose coal and coal dust were on the floor along the greater part of the older back and parallel entries.

"Sufficient rock dust had not been applied on the roof and ribs at several places in advancing entries or at many places in parallel and older back entries, even though other parts of the back and parellel entries were blanket rock-dusted."

The report added that "section foremen and employees acknowledged that some of the hazardous practices that contributed to this disaster were known by them to be dangerous and that such practices were not permitted or performed when high company officials or State or Federal inspectors were present."

Two mine-rescue crews, accompanied by company, State and Federal officials, went underground a few hours after the Nov. 13 explosion, but were recalled to the surface about 2 hr later because of dangerous quantities of gas that might be close to the fires that raged in the mine.

The second explosion, occurring shortly afterward, made further access to the mine virtually impossible and destroyed all hope of rescuing the entombed 15 men. It was then decided to seal the mine's five openings, and smother the fires. This decision was concurred in by officials of the company, the United Mine Workers of America, the West Virginia State Department of Mines, and the Federal Bureau of Mines. Subsequent investigation revealed that 12 of these men had been killed instantly and the other three had succumbed within about 90 min of the first explosion.

The third and fourth explosions occurred after the seals had been completed, breaking two of them. Final sealing was completed Nov. 17.

The first seal was opened March 10, 1955, and recovery work began March 14. Because of extremely difficult conditions, including a fire which rekindled March 19, the last of the victims was not recovered until May 31, 1955.

The mine was out of production from the day of the explosion, Nov. 13, 1954, to July 24, 1955. One working section still remains closed.

The Bureau's investigation, made with the cooperation of company, Bituminous Coal Operators Assn., UMWA, and State officials, included examinations of the underground workings of the mine as well as interviews with men who worked in the mine. It was conducted by W. R. Park, District Health and Safety Supervisor at Mt. Hope, W. Va.; W. D. Walker, Jr., District Health and Safety Supervisor at Pittsburgh, Pa.; J. J. Dougherty, Subdistrict Health and Safety Supervisor at Morgantown, W. Va., and M. L. Davis, Bureau safety representative, Washington, D. C.

SAFETY PLANNERS—A total of 367 men have enrolled in a 10-week safety course in accident prevention at the Lochgelly Mine, The New River Co., Lochgelly, W. Va. The men above made the plans in cooperation with the U. S. Bureau of Mines. Seated Ralph Allenbaugh (left), superintendent; Francis Foster, president Local Union 6046; Lloyd G. Fitzgerald, mining engineer, Bureau of Mines, instructor; Frank Simms, district inspector, W. Va. Dept. of Mines. Standing (left to right) are: William L. Burruss Jr., chief engineer, New River Co.; Andrew Easton Jr., inspector at large, New River Div., W. Va. State Dept of Mines; Bernie Kania and Richard Carter, safety committee; and Jonathan Allen, mine committeeman, all of Local Union 6046; and James Coffey, general mine foreman.

Bituminous Output

YEAR TO DATE	PRODUCTION
April 14, 1956	148,767,000
April 16, 1955	126,983,000

1956 output 17.2% ahead of 1955.

A month earlier output was 15.1% above 1955.

WEEK ENDING	PRODUCTION
April 14, 1956	10,050,000
April 16, 1955	8,413,000

Anthracite Output

YEAR TO DATE	PRODUCTION
April 14, 1956	8,082,000
April 16, 1955	7,979,000

1956 output 1.3% ahead of 1955.

A month earlier 1956 output was 2.4% over 1955.

WEEK ENDING	PRODUCTION
April 14, 1956	545,000
April 16, 1955	407,000

Anthracite Committee To Revise Allocation Plan

Anthracite's Committee of 12, formed in 1930 by operators and the United Mine Workers to consider questions of performance, cooperation and efficiency, met last month in Wilkes-Barre, Pa., to formulate plans to expand anthracite's existing markets and to improve working conditions.

After a 3-hr meeting in the Anthracite Institute's offices, the committee appointed a sub-committee to revise the present allocation plan. In a broadly-worded resolution announced by chairman Harry J. Connolly (president of Pennsylvania Coal Co.), the members declared: "The chairman of the Committee of 12 is directed to appoint a committee for the purpose of revising the present allocation plan in an effort to make it a more effective instrument. The revised plan, after consideration by the operators is to be submitted to the Committee of 12 for appropriate action."

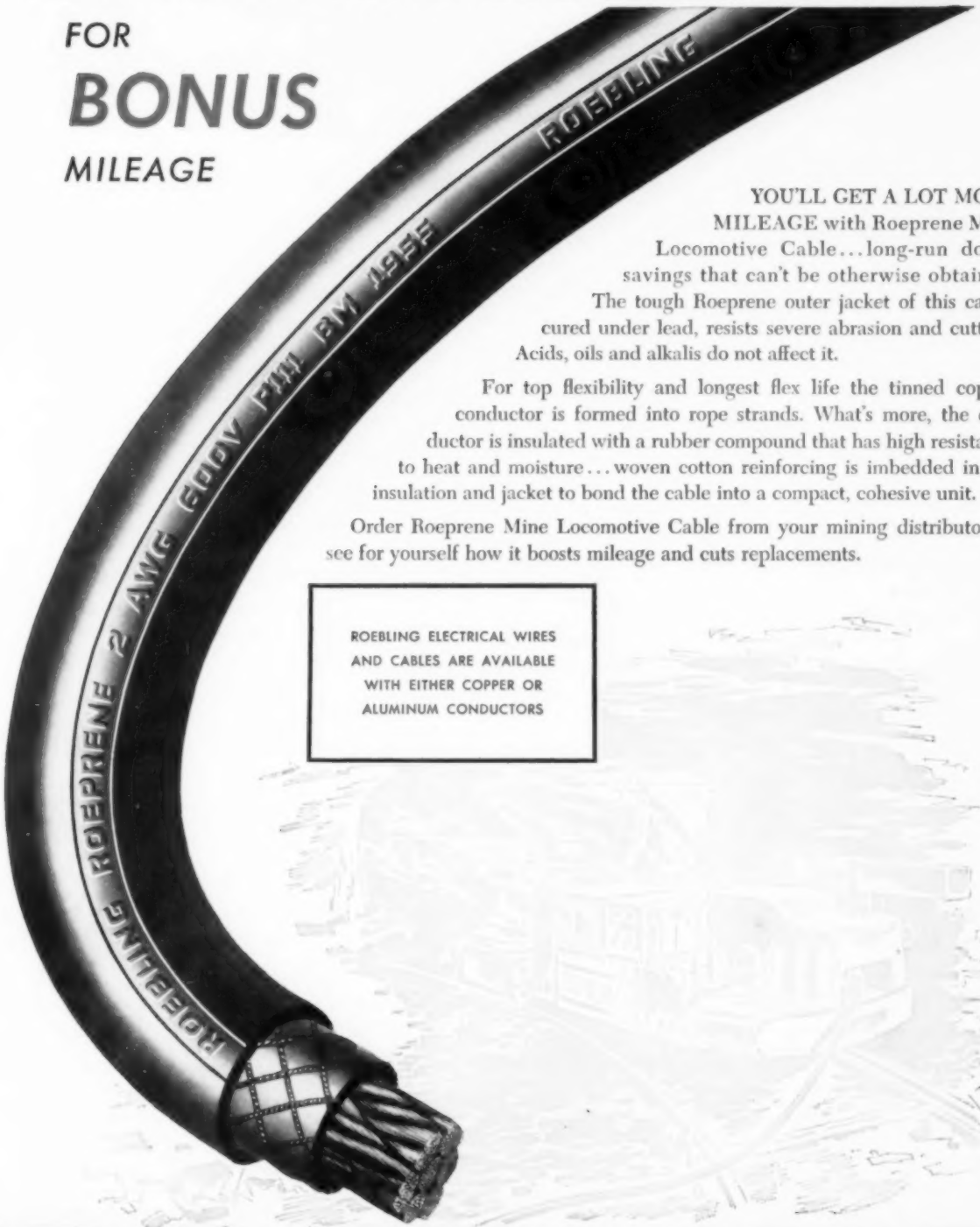
In announcing the action chairman Connolly said the resolution had been

ROEPRENE MINE LOCOMOTIVE CABLE

FOR

BONUS

MILEAGE



YOU'LL GET A LOT MORE MILEAGE with Roeprene Mine Locomotive Cable... long-run dollar savings that can't be otherwise obtained. The tough Roeprene outer jacket of this cable, cured under lead, resists severe abrasion and cutting. Acids, oils and alkalis do not affect it.

For top flexibility and longest flex life the tinned copper conductor is formed into rope strands. What's more, the conductor is insulated with a rubber compound that has high resistance to heat and moisture... woven cotton reinforcing is imbedded in the insulation and jacket to bond the cable into a compact, cohesive unit.

Order Roeprene Mine Locomotive Cable from your mining distributor... see for yourself how it boosts mileage and cuts replacements.

ROEBLING ELECTRICAL WIRES AND CABLES ARE AVAILABLE WITH EITHER COPPER OR ALUMINUM CONDUCTORS

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLINGS ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

adopted "among other things to secure more uniform working time throughout the industry."

"The meeting was called," he said, "to take some joint action between the UMWA and the operators to expand the markets existing in anthracite and improving the conditions existent in the industry."

The details of how the industry would approach the problem of expanding its market was not announced by Mr. Connolly.

Among the members of the committee was John L. Lewis, UMWA president, who said the group had talked about "questions of policy, relationships, market trends, and uniformity of employment." He denied any union-management contract talks, saying that "substantially we discussed the question of uniformity of work in the anthracite industry."

Alcoa to Build $80 Million Smelter

The Ohio River Valley's powerful attractions were proved again last month when the nation's largest primary aluminum producer announced plans for an $80 million reduction plant 18 mi east of Evansville, Ind. (map). The plant was the third announced by major industrial institutions in the last few months (Kaiser Aluminum and Olin Mathieson).

Alcoa said that the new plant would have a capacity of 150,000 tons a year and that initial production had been scheduled for the fall of next year. Full operations are expected by mid-1958, when electric power from a new 375,000 kw steam plant is available for use. Until the new power plant is finished, the smelter will get power from the southern Indiana Gas & Electric Co. which will also operate the new plant.

Docking facilities will be built to handle river shipments of aluminum and Alcoa expects employment at the entire project to total about 1,200.

For coal the chief benefits will be derived by the Peabody Coal Co. L. Russell Kelce, president, said that Peabody had made a long-term arrangement with Alcoa to furnish coal for the new generating plant.

Keystone, Mine Directory Publication Date May 7

The 1956 editions of *Keystone Coal Buyers Manual* and *Coal Mine Directory* will be published May 7, according to Joe Forsythe, general manager. Both the manual and the directory are McGraw-Hill publications. *Keystone* covers the coal industry, sales companies, export companies, coke ovens, river docks, cleaning plants, seams and operating companies and mines. The *Coal Mine Directory* is a reprint of the *Keystone* section devoted to operating companies and mines. Both publications reflect the upsurge in coal that became apparent in 1955 and have included all new mines and new cleaning plants. Production figures for each of the 85 mines that produced more than 1,000,000 tons in 1955, are included. Nearly 1,400 companies and 1,776 mines are listed. These produce more than 90% of 1955's total production of 512 million tons of anthracite, bituminous and lignite in the U. S. and Canada.

News Briefs

Fairmont Machinery Co., subsidiary of Pittsburgh Consolidation Coal Co., has been commissioned by the parent company to construct a $7 million cleaning and preparation plant for the Sugar Run No. 22 mine of Jamison Coal & Coke Co., Fairview, W. Va. Fairmont expects to begin actual construction in about 3 mo. Development of the mine is expected to require 18 mo. Capacity is estimated at 15,000 tpd.

Peabody Coal Co. announced April 19 that it had ordered the biggest stripping shovel ever built from Marion Power Shovel Co. L. Russel Kelce, company president, said the shovel's bucket will hold 70 cu yd and will be used to remove over-burden from a St. Clair County, Ill., mine. The new shovel will make Hanna Coal's "Mountaineer," with its 60-cu yd bucket, the world's second largest.

The Federal Coal Mine Safety Board of Review has ordered Inland Steel "to restore a reasonable degree of protection from disaster" in the company's Wheelwright mine, Wheelwright, Ky. Actually the mine consists of 4 individual operations which have been connected by haulageways and entries. A USBM inspector found gas in one of the mines and classified all of the connected mines as gassy. In its appeal to the Federal Safety Board, Inland Steel contended that the mine containing the gas should have been the only mine to which the order applied. But the Board said that whether previously separate mines which are now connected underground constitute a single mine, depends on the relation of the connections. If Inland Steel complies with the order, the gassy classification will apply only to the mine in which gas was found. If not, then the classification will apply to the four mines. In its decision the Board condemned a 1953 ruling which held that a single mine could be subdivided into separate mines by making separate leases without regard to physical interconnections.

Coal and allied interests won a favorable decision when the Federal Power Commission refused to permit Northern Natural Gas to supply interruptible service to the Black Dog Lake steam electric generating station of Northern States Power. The FPC said that since there is abundant coal available to meet the Black Dog plant's fuel needs, but natural gas is limited in quantity, it could not permit natural gas to be used as a boiler fuel. The FPC said natural gas is a premium fuel and "uniquely adaptable to many superior uses" other than as a boiler fuel.

West Virginia Coal & Coke Co., Cincinnati, is asking its stockholders to vote to change the company's name to Midland Enterprises, Inc., a move that recognizes the corporation's booming river traffic business. The company's subsidiary, Ohio River Co., has been the chief revenue producer for W. Va. Coal, which sold its remaining coal mining facilities and other related assets early last year.

Colorado Fuel & Iron officials announced the Morley Mine south of Trinidad, Colo., would be closed May 4. The announcement said that all workable coal had been extracted. More than 11 million tons of coal have been produced since the mine opened in 1906. Its peak production was 491,000 tons in 1928. Its present force of 150 men will either retire or be absorbed in the company's Allen mine. Morley, because of its gassy condition, was one of the few mines where mules were used in the operation. Despite the gassy condition, the mine achieved a number of safety records.

A New York coal and chemical company, the Simpson Coal and Chemical Corp., acquired control of West Virginia's Wyatt Coal Co. for an estimated $320,000. Wyatt's new officers are Paul Bock, president; C. A. Goldschmidt, vice president; Alfred A. Adrian, treasurer; Karl J. Schumer, secretary; all New York; and John J. Lane, Charleston, W. Va. assistant secretary. Mr. Bock replaces James S. Conley of Wyatt Coal, which will keep the same name. Most of the present 150 employees will work at mines near Eskdale, Sharon and Laing on Cabin Creek. The Wyatt Coal Co. was organized in 1906 by the late John Laing and had been managed by the Laing family since then. The mines pro-

News Briefs *(Con't from p 128)*

duce about 2,200 tpd with reserves of some 90 million tons.

More than 9 billion tons of coal are believed contained in an area of about 1,000 sq mi in Routt and Moffat Counties in northwestern Colorado, according to a geological survey bulletin by the Department of the Interior. All the coal is estimated to be situated between the surface and a depth of 3,000 ft. The area is known as the Yampa coalfield. The deposits are bituminous and anthracite, the report says.

(Continued on p 132)

Preparation Facilities

Clinchfield Coal Corp., Dante, W. Va.—Contract closed with the Deister Concentrator Co., for 20 SuperDuty Diagonal Deck No. 7 coal washing tables and two Model 108-B Concenco revolving feed distributors, 10-way split. The No. 7 tables will clean ¼x0 fraction of the coal at the plant.

Nashville Coal Co., Madisonville, Ky.—Contracts closed with the Jeffrey Mfg. Co. for 3-cell addition to 2-compartment Jeffrey jig for 8x0 coal. Capacity 400 tph.

Lake Superior Coal Co., Superior, W. Va.—Contract closed with the Jeffrey Mfg. Co. for one 84-in, 8-cell Jeffrey Baum jig. Size: 7x0 coal. Capacity: to wash 300 tph coal and treat 59 tph crushed middlings.

Rochester & Pittsburgh Coal Co., Indiana, Pa.—Contract closed with Industrial Engineering & Construction Co. for air-cleaning equipment to treat 80 tph of $\frac{3}{16}$x0 coal. The plant (O'Donnel Mine) will be equipped with cyclone and cloth-type dust collectors. Installation date, approximately July 15.

Williams River Coal Co., Cowen, W. Va.—Contract closed with Fuel Process Co. for 120-in Duplex Angle Type Belknap coal washer for Crichton No. 5 mine to wash 4x$\frac{3}{8}$ coal at 120 tph. Completion date June 1.

Callahan Coal Co., Reynoldsville, Pa.—Contract closed with Fuel Process Co. for a 70-in Straight Line Belknap coal washer for 2x$\frac{3}{8}$ coal, 70 tph. Completion date May 15.

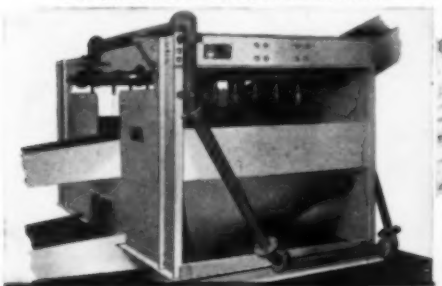
Piney River Coal Co., Fireco, W. Va.—Contract closed with Fuel Process Co. for a 60-in Angle Type Belknap coal washer for 2x$\frac{3}{8}$ coal, 60 tph. Completion date May 15.

Clinchfield Coal Corp., Splashdam mine, Haysi, Va.—Contract closed with The Daniels Co. for a complete new preparation plant, including a DMS Dense Media System to wash 5x¾ ROM. Completion date July, 1956.

Pocahontas Fuel Co., Sagamore-Crane Creek mine, McComas, W. Va.—Contract closed with The Daniels Co. for a complete new preparation plant, including a DMS Dense Media System to wash 8x¾ ROM from Pocahontas No. 11 seam. Completion date July, 1956.

Wilmot Builds Complete Preparation Plants or Single Equipment Units

* U.S. & FOR. PATENTS PENDING. THE CEE & CHEMICAL CORP.



"WILMOT-DCC HEAVY-MEDIA VESSEL -- Offers unprecedented simplicity. 7 models: 25 to 400 tph of feed.

WILMOT CONE CLEANER -- Cleans bituminous down to 10 M; anthracite, Stove to No. 4.

WILMOT CLASSIFIER -- Cleans bituminous (100x0); anthracite (-3/64" x +48 M). Also froth flotation.

Automatic Cleaning Units for Every Use. Pilot Plant Test Facilities Available.

For nearly 50 years, Wilmot has been designing, building and equipping coal preparation plants exclusively. A wealth of engineering and construction experience is available to you, whether your requirements are a single unit of replacement equipment or a complete plant. Wilmot furnishes equipment for four coal cleaning processes: heavy media, cone cleaning, classifier, froth flotation. Embodying Wilmot patented controls, they are fully automatic. At our White Haven, Pa., pilot plant, we maintain laboratory and commercial sizes of Wilmot equipment for customers' testing use.

Pilot Plant, White Haven, Pa., houses commercial size Wilmot cleaning units.

WILMOT ENGINEERING CO. HAZLETON, PA. Plant: WHITE HAVEN, PA.

News Briefs *(Con't from p 130)*

U. S. Steel Corp. bought 160 acres of fee coal lands in Delta County, Colo. The company's Columbia-Geneva Steel Div. said the properties are adjacent to sizeable holdings purchased late last year from the Minerals Development Corp., Salt Lake City. No immediate plans have been announced to extend operations to the new property.

More than 160 men of the Colorado Fuel & Iron Corp., Morley Mine and Local 5938, UMWA, received certificates for 100% participation in the accident prevention program of the Bureau of Mines. A certificate was presented at a meeting of the mine chapter of the Holmes Safety Assn. and was the 295th presented for 100% participation since the beginning of the safety program in 1947. Thus far, 140,781 men have completed the course.

DeKoven Coal Mining Co.'s mine in Union County, Ky. (cost: $4,000,000) is expected to be producing within 2 mo. Courtney Quirey, president of DeKoven, said coal has been reached and that as soon as surface facilities were constructed operations would begin. About 300 persons will be employed in the mine. Annual capacity is estimated at 1,200,000 tons by 1958.

(Continued on p 135)

1955 Coal Earnings

Elkhorn Coal Co.—1955 net loss of $75,519 on net income of $576,572, after giving effect to profit of $640,360 on sales of assets.

Pocahontas Fuel Co.—1955 net income per share $5.23 on net sales of $94,780,822 compared with a net income per share of $1.93 in 1954 on net sales of $69,462,332.

Peabody Coal Co.—Net income for 1955 $6,634,744, or 81 cents a common share. Profit included special credits of $950,000 for income tax provisions and $409,089 net gain on sale or liquidation of subsidiaries. No comparable figures available, but in 1954 Peabody's net was $325,092. The annual report of April 30, 1955, showed a deficit of $1,650,608.

1956 Earnings

The Colorado Fuel & Iron Corp.—1956 net earnings for the first quarter: $8,010,314 before taxes and $4,016,414 after taxes, compared, with $5,994,794 before Federal taxes in 1955 and a net profit then of $2,929,894 after taxes. In the first quarter of 1955 CF&I paid $1.04 per share; in the first quarter of this year $1.14 a share was paid.

Pittsburgh Consolidation Coal Co.—Net income of $3,295,000, equal to 51 cents a share on common stock for the first quarter, compared to net income of $2,399,000, or 37 cents a share, in the same period last year.

How to switch "rigs" on the go...
get "four-for-one" machine utility!

From the seat and on-the-go you instantly get any material-moving action you need with an International® Drott® Four-In-One!

You'll be cascading dirt in dozer position and suddenly need carry-type scraper action. Touch the "machine selector" lever with finger-tip ease, and you have it—to grade, strip, or spread with accurate clam lip control!

Touch! again, for Skid-Shovel position. And with exclusive Drott triple-power, pry-over-shoe break-out action, you can be tearing up and loading stuff as tough as concrete pavement—often where even a power shovel fears to tread!

Touch! once more—and a fast-working clamshell can be gulping aggregate in a space barely big enough to contain your outfit! And giving you a "hopper-high" dumping reach, 30 inches above ordinary roll-forward buckets!

Prove to yourself a Four-In-One will save uncounted hours of changeover time—give 4-machine utility for one moderate investment. Now available in 3 sizes: 1-yard to 2¼-yard capacity, all with the built-in protection of exclusive, shock-swallowing Hydro-Spring. Ask your International Drott Distributor for a Four-In-One demonstration!

Material-Loosening Scarifer Attachment! It's simple to install this scarifer attachment, to speed straight-forward bucket loading. The third or extra valve (which is standard equipment on all Drott Skid-Shovels) is used in this operation. This hydraulic-controlled scarifer has deep penetration, and strength for hard materials. See and try it!

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 8, Wis.

INTERNATIONAL HARVESTER

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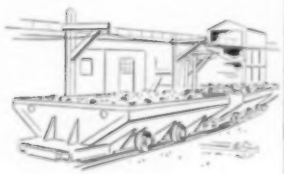
it's simple arithmetic

Figure it out for yourself! ONE BIG haulage system completely shutdown by one small repair job equals zero production capacity. TWENTY **acf** *Constant Haulage* Mine Cars affected by one small repair job still leaves you 95% capacity. The damaged car is simply switched to a siding and the rest of the load moves on!

Why not call in your nearby **acf** Representative and get all the facts about the shutdown-proof, nonstop-unloading **acf** *Constant Haulage* mine car system? American Car and Foundry Division, **acf** Industries, Incorporated. *Sales Offices:* New York • Chicago • St. Louis Cleveland • Philadelphia • Washington • San Francisco. *Plants:* Berwick, Pa. • Milton, Pa. • Huntington, W. Va. • St. Louis, Mo. • St. Charles, Mo.



More Wheel Milage!

Ask for the facts about our NEW "LOAD SUPPORT" MINE CAR WHEELS that stop tread splitting "break-offs," "flats" and "load-lifting" ...deliver more milage.

acf **MINE CARS**

for Constant Haulage

News Briefs *(Con't from p 132)*

The Old Ben Coal Corp. has announced it will sink a new mine in southern Illinois 2 mi northeast of Sesser in Franklin County. A twin-shaft development, the mine will be the first opened in Franklin County since 1949. Work crews will start sinking a shaft within 30 to 60 days, but it will be 2 yr before the mine is ready to produce.

George H. Love, president of Pitt Consol, was elected board chairman of the M. A. Hanna Co., parent company of Pitt Consol. Mr. Love had been acting chairman and vice-chairman of Hanna since George M. Humphrey relinquished the post to become Secretary of the Treasury.

The National Coal Association established a $500 scholarship in fuel technology at Pennsylvania State University. The scholarship will be awarded to a freshman entering fuel technology curriculum in September and will be renewed for the following 3 yr if the student maintains satisfactory standards. High school graduates from all areas are eligible.

Bituminous coal miners' wages exceeded $100 a week for the first time in history in December, 1955 and January, 1956, according to the Bureau of Labor Statistics of the U. S. Dept. of Labor. In December, the miners earned $105.73 and in January, $104.22. Average weeks, hour-wise, was 39.6 in December, 38.6 in January. Anthracite gross weekly earnings in December were $88.23, $91.96 in January. Anthracite miners worked 34.6 hours in December and 35.1 hours in January.

Montana-Dakota Utilities Co. will build a 44,000 kw steam electric generating plant near Sidney, Mont. The plant will burn lignite. Coal burning and coal handling equipment, however, will not be ready until the fall of 1958. Montana-Dakota is investing $8,000,000 in the project. It is going ahead with lignite as a fuel on the basis of recommendations from Arthur D. Little & Co., Cambridge, Mass., consulting engineers. Little & Co. reports that lignite used on a large-scale basis for generating electricity is as economical as hydro power. Lignite which is plentiful in the area probably will be taken out by strip operations.

Southern railroads have joined eastern and western carriers in seeking a 5% passenger fare boost. The southern roads, however, have asked for an effective date of May 15 instead of May 1, the date proposed by the other roads.

E. J. Davis, Somerset, Ky., vice president and receiver for the Cutshin Coal Co. in Kentucky's Perry County, has filed a civil suit seeking $2,022,000 damages from the UMWA. The suit charges that a coal tipple operated by the company was set afire intentionally. The company went into receivership in 1953. In his petition Mr. Davis said the tipple was destroyed by fire May 14, 1955 and that mine production stopped "as a result of the destruction of the tipple." He seeks $1,500,000 punitive damages and $522,000 actual damages.

P. C. Spencer, president of Sinclair Oil Corp., predicts higher oil prices. Pushing oil up, says Mr. Spencer, are the costs of finding oil and the cost of refining it. Producers have held prices fairly stable in the past three years, he says. But meanwhile, the industry wants a flat 20% hike in the price of crude oil with commensurate price boosts for all refined products.

The number of anthracite producing companies dropped from 105 in 1952 to 81 last year, a loss or 24 companies in a 3-yr period according to the Anthracite Institute.

(Continued on p 144)

COAL MEN ON THE JOB . . .

AMHERST COAL CO.—Dana slope, Rensford, W. Va. Wesley Bitzer, Jr. (left), resident engineer; and Ray Burke, engineering assistant.

Why is P&H *of the*

MAGNETORQUE* and ELECTRONIC the only modern

These revolutionary advances in design and performance of electric shovels are just two of the reasons why operators and owners are pointing to P & H for their outstanding achievement in electric shovels . . . why P & H now is at the head of the Big Three . . . why P & H can promise you the only modern electric shovel.

Just think! Power transmission *without friction's* in massive electric shovels. Boosts efficiency. Cuts maintenance and operating costs. *This is Magnetorque.* Exclusive with P & H.

Just think! Complete control of dig, hoist, swing and propel of these giants with simple stepless control. 12% faster cycles; 16% savings in operating time. *This is Electronic Control.* Exclusive with P & H.

For complete information, call your P & H representative. Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

For Modern Engineering, Look to

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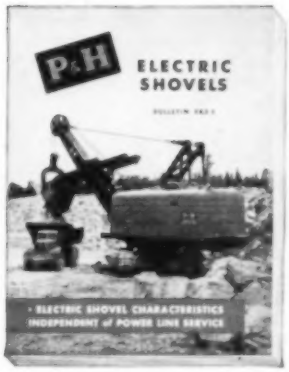
ELECTRIC SHOVEL DIVISION

at the head Big Three?

CONTROLS give operators electric shovels

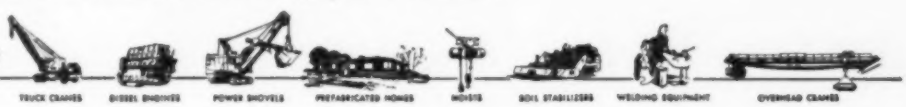


For a clearly illustrated description of Magnetorque* and how it sets a new standard for electric shovel design and operation, write for Bulletin X-156. Other booklets available on electric shovel models from 3 to 10 cu. yd. capacity. A copy of these publications will be sent those who request it on their company letterhead.

*T. M. of Harnischfeger Corp. for Electro Magnetic Type Coupling

CORPORATION *Milwaukee 46, Wisconsin*

the P&H *Line*



Foreign News

GREAT BRITAIN

(This month Coal Age brings you a special report on mining developments in Britain from John A. Tunstall, technical editor of the London Bureau, McGraw-Hill World News. Here is his report).

London, England
April, 1956

Britain's National Coal Board says that a number of important developments in coal mining equipment, techniques and instrumentation are either in actual use or in the lab. In the equipment field, the biggest advances are represented by (1) an auto percussion coal plow and (2) walking hydraulic props which locate and operate in pairs and will form, ultimately, part of a completely automatically-worked coal face. Among the new techniques is a blasting system called pulsed infusion shot firing. High pressure water pumped into a seam through a boring spreads the effect of an explosion over a wide area. A new "permitted" explosive has been developed.

New transistorized research tools and other instruments which open new avenues of underground research include:

1. Load cells for measuring stress or strain in undisturbed strata with plug-in, light-weight battery recorders.

2. A dust sampler which simulates respiratory function and collects particles which would reach lung tissue during an 8-hr shift.

These are among the immediate results of a research program set up three years ago by the National Coal Board (N.C.B. Mining Research Establishment, Isleworth), to banish the hit and miss philosophy of developing tools and techniques.

Most British coal seams are too hard to be worked by commercially available coal plows. Both the transverse pulling force required and the cutting reaction normal to the face are too great. In the British development an intermittently percussive plow is employed.

Development was based on a long series of tests to discover the forces developed on a plow during normal operation. Strain gauge technique was used on simulated plowing rigs working on the hardest coals in Britain. Numerous variables were examined but cleat direction and tool angle proved most important. Tractive force plot showed that high peak loadings rise and fall rapidly at fairly frequent intervals, with magnitude, frequency and mean force largely depending on cleat direction. Between peaks force can drop to zero. As the cleat direction approaches 90 deg to the face the peaks increase but the near-constant force during the much longer intervals between peaks diminishes. The higher the peak forces the lower would be the mean force—hence the lower the energy requirement. To use this characteristic some method had to be found to reduce the short peak horsepower demand and the high loads imposed on the conveyor.

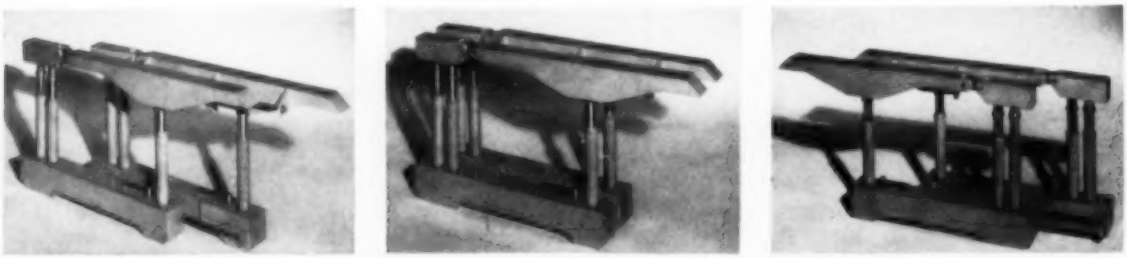
PNEUMATIC AUTO-PERCUSSION PLOW installed in Main Bright seam. Warsop Colliery, in England.

The resistance suggested a percussion action on the cutting blade, which was tried by the Germans some 10 yr ago, but abandoned. Evidence of the effectiveness of percussive plowing was obtained, however, at Isleworth on a single blow-type laboratory rig designed to show the relationship between the load at which to start the percussion action, size of blow, and energy requirement. This showed need for intermittent, selective percussion and the reason for the ineffectiveness of the German approach. It revealed that there was an optimum tool reaction at which to start hammering and an optimum blow magnitude. This not only minimizes air consumption, but reduces the pulverization occurring with blows away from the optimum, the effect of which is to cushion the impact.

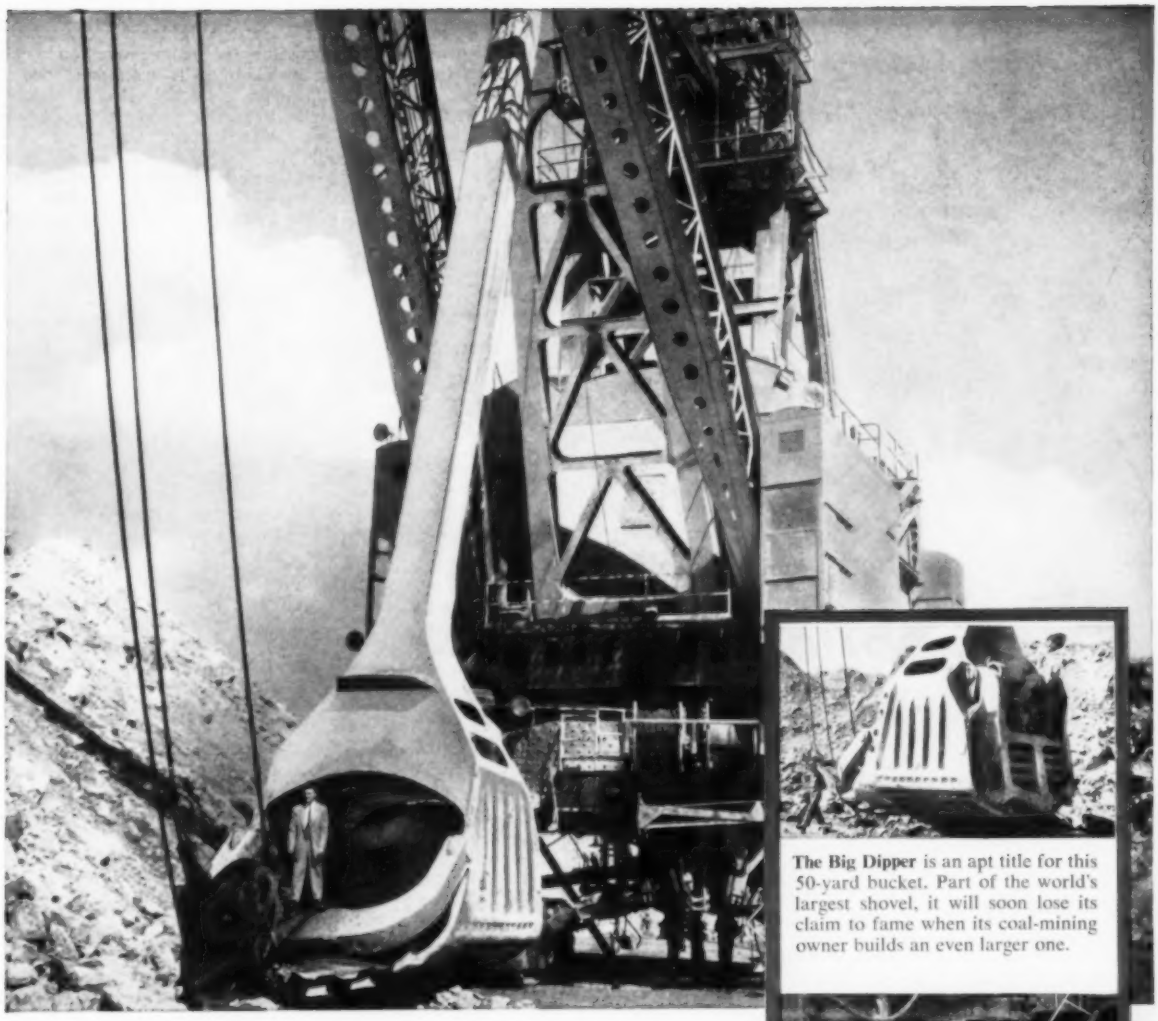
The latest of several prototypes has now been passed to Holman Bros. Ltd. for final production development. It is designed to fit the German Panzer conveyor (Westfalia Lunen Panzerforderer) with an Anbauhobel drive modified to provide a constant pulling force instead of constant speed. Overall length of the plow is 83 in; its width between cutting face and conveyor is 20 in.

It takes a 4-in cut, which imposes an optimum pulling requirement. Very little dust is produced and the overall energy requirement and maximum power demand are said to be lower than with any other plowing equipment. The percussion device is simply a pneumatic hammer operating with a spring loaded pilot valve sensitive to tool reaction. As soon as the haulage force reaches a preset valve the pneumatic hammer is automatically triggered. The supply value does not reset until tool resistance drops again below the present value. The percussion blows amount to about 90 ft lbs and are directed at about 10 deg to the coal face.

Another development is a new blasting technique called pulsed infusing shotfiring, which is now going into general use in British coal mines. It is largely the work of the explosive division of Imperial Chemical Industries Ltd. Among its important advantages is a tendency to presoften a seam to permit even conventional



MODEL OF Isleworth-Dowty advancing hydraulic support props, which advance by means of a walking action.



The Big Dipper is an apt title for this 50-yard bucket. Part of the world's largest shovel, it will soon lose its claim to fame when its coal-mining owner builds an even larger one.

Quiet, Cities Service at Work! In the mammoth gears beneath the shovel, Cities Service Trojan L Compounds give outstanding lubrication. They were chosen by the owner for all mechanized equipment.

Even the Trucks are Giants! Each big Euclid carries a 60-ton payload. Gear failure would be extremely costly. But that's no problem with Trojan L Compounds for lubrication.

Find the Cities Service Lubrication Engineer

Henry Zielasko, the Cities Service Lubrication Engineer in this picture, may look small, but he's no drop in the bucket in the operation of the world's largest shovel.

The reason: Henry supplies the gear lubricants—Cities Service Trojan L Compounds—for *all* the equipment owned by this giant mining company. And, to get the job, his Cities Service lubricants had to prove their superiority in rigid tests against those of every major competitor.

Henry, and the many other skilled Cities Service Engineers like him, are prepared to prove the merits of themselves and their products to you in the same manner. Put them to the test! Call your nearest Cities Service office, or write: Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

plows to work harder coals.

The system involves drilling a hole 5 ft long into a coal face, placing the explosive cartridge at the blind end, then sealing the hole with a diffusion plug. Water under high pressure is pumped into the hole through a tube in the plug and penetrates through fissures and cracks in the seam forming a hydraulic matrix. When a charge is detonated, high pressure impulses are then transmitted throughout the matrix. This pressure distribution is then able to exploit the natural weaknesses of the seam and to break down coal over a wide area.

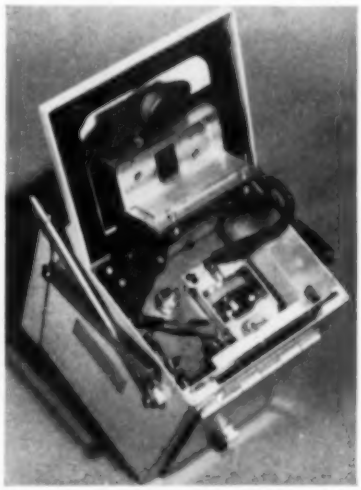
Interest in strata control work centers on hydraulic walking props around which is being designed a completely automatically-worked face. Dowty Mining Equipment Co., which invented the liquid-sprung leg for aircraft, is now making a set of six units for an extensive underground experiment. Single units have been tried out over a considerable period.

The props are designed to work in pairs and locate on each other (photos). Each prop has two hydraulic rams at the trailing end and a single ram at the other. They are supported on a rigid plate designed to slide along the ground and are restrained at the top by an articulated beam hinged near the middle to allow for roof deflection.

As the front advances, first one and then the other is lowered, advanced and raised. The result is that at any location there is always one under load when one is being advanced or reset. Pairs are spaced at about 4-ft intervals along the face and connected to a conveyor by horizontal jacks. These are used to advance themselves and the conveyor as the front progresses.

A number of instruments and equipment have been specially developed to use underground to measure stress systems set up in strata during mining. These include load cells, which are placed between the props and the roof. The cells consist basically of a vertical steel cylinder, deflections on the internal wall being measured by strain gauges. A total of sixteen gauges are used in conjunction with a Wheatstone bridge network, which compensates for temperature and eccentricity effects. The operator carries a galvanometer and a light six-volt battery in a chest pack and plugs in at each cell to get a direct stress reading.

Another instrument now ready for production is a dust sampler, which simulates the respiratory function, designed to be planted at strategic sites underground

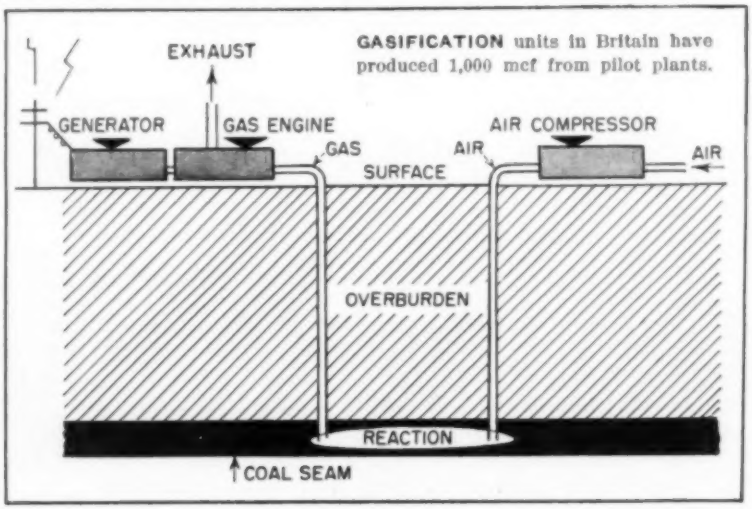


8-HR CONTINUOUS DUST sampler with thermal precipitator.

and collect dust samples over a shift period of eight hours. Dust-laden air is inhaled by a small clock driven bellows through a sampling head at the rate of 2 ml a half minute and is exhaled in another half minute. An artificial nose removes all particles above 5 microns which would normally be collected in the nasal passages. The remaining sizes, which do reach lung tissue, are precipitated thermally on a microscope slide.

John Tunstall

Gas produced by burning coal underground can be used economically to generate electricity at a cost of less than



GASIFICATION units in Britain have produced 1,000 mcf from pilot plants.

3.5 cents a therm if circumstances are favorable. This conclusion is drawn from trials carried out over the past six yr in England. More than 1,000 mcf has been produced from 5,000 tons of coal since drilling began in 1949. Underground gasification is accomplished by passing air through a coal seam burning under controlled conditions (drawing). The gas released has been used to drive engines which generate electricity for transmission. Each pilot installation (Derbyshire and Worcestershire) gasify some 50 tons of coal daily. The 3.5-cent cost is half the cost of imported coal (7 cents a therm). The National Coal Board estimates that there are 300 million tons of coal in the United Kingdom which are uneconomical to mine and 200 million more tons situated in sloping, thin and very deep seams. (Photo on p 140)

Britain imported 1.5 million tons of coal during the first eleven weeks this year against 2.23 million in the same period last year. Exports and bunkers in the same period fell from 2.86 million tons to 2.18 million. Pricewise, Britain is selling its coal for less than it costs to produce it, according to Joseph Latham, deputy chairman of the National Coal Board. Much of the trouble stems from labor, which is costly and scarce. Between 13,000 and 15,000 vacancies for miners exist.

INDIA

The biggest coal washing plant in Asia will be ready for operation in Bihar in the Kargali Bokaro coal fields by January, 1958. Costing $3.4 million (a turnkey job), the plant will wash metallurgical coal that is required for state-owned steel plants being constructed in Rourkela and in Bhilai. Washing capacity is 2.2 million tons annually. A Japanese firm, Daiichi Bussan Kaisha Ltd, was given the construction job after outbidding Hungarian and British rivals.

JAPAN

Union leaders agreed early last month to settle a 13-day strike that had tied up Japan's 56 major coal mines. A settlement plan offered by government mediators gives miners a lump-sum bonus of $8.88 and a monthly increase of $1.26. Originally, the union had demanded $5.58 a month for Japan's 18,000 miners, who receive an average monthly wage of $50. The strike cost Japan about 1,170,000 tons of coal and forced the government to purchase 60,000 to 80,000 tons from Communist China and Soviet-held Sakhalin Island.

RHODESIA

The Rhodesian Anglo American Co. and Wankie Colliery Co. have decided to finance a preliminary investigation into the oil-from-coal potentialities of Lubimbi coal field. The field lies on the Bulawayo-Livingstone Railway Line and contains an estimated 80 million tons of reserves.

LUXEMBOURG

The High Authority of the European Coal and Steel Pool (ECSC) has decided to lift the price ceiling on Ruhr coal beginning last month. This means that coal prices will be free throughout the six-nation community. The controls had been retained mainly because of the dominant position of the West German coal selling cartel, GEORG. But this difficulty was removed by a decision to disband the cartel April 1.

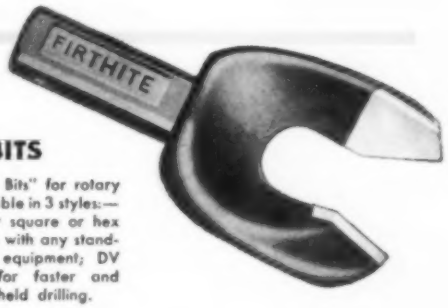
WEST GERMANY

American coal has replaced British coal imports to West Germany. British coal exports have virtually ended owing to increased British home demand, the Association of British Importers has announced. The Association said that from 1953 to 1955 imports of British coal averaged 1.5 million tons yearly. Recent restrictions in Britain, which had already showed themselves in 1955, have had a marked effect in the north of West Germany, a sector that has always preferred to buy British coal. The Association's members are wondering whether the United Kingdom will be able to deliver any coal this year. They say that if this occurs the price of British coal will have to be lowered to take account of the competitive state of inland coal production.

Delivery from Stock in every mining area...

ROOF BITS

Firthite "Blue Bits" for roof drilling are made in 3 styles: RDL for light uses and very soft roof rocks; RDH with extra heavy duty insert to resist gage wear for most difficult roof drilling; RDS (slotted) for faster drilling of medium to hard roofs. All are water channeled for either wet or dry work.



DRILL BITS

Firthite "Blue Bits" for rotary drilling available in 3 styles:—D with either square or hex shank for use with any standard drilling equipment; DV (illustrated) for faster and easier hand held drilling.

MACHINE BITS

Firthite "Blue Bits" for mining machines include bit design, style and grade for every need from light to rugged condition on continuous mining equipment.

FINGER BITS

Firthite "Blue Bits" for use in standard drill heads feature two-surface brazing with tips set in recesses for greater strength. Available in all popular sizes.

FIRTHITE

"BLUE BIT"

MINING TOOLS

Firth Sterling

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Denver	Union Supply Company
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W. Frankfort	Austin Powder Company
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Kentucky	
Harlan	McComb Supply Company
Madisonville	Austin Powder Company
New Mexico	
Carlsbad	Carlsbad Supply Company
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Weirton	Weirton Ice & Coal Supply
Zanesville	Dunlap Welding & Supply
Pennsylvania	
Johnstown	Mole-Bits Company
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Scranton	Carl B. Lewis
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Clarksburg	Austin Powder Company
Logan	Guyan Machinery
Wheeling	Service Supply Co.

Mr. Tooley says—

"Firthite 'Blue Bits' are better because Firth Sterling makes *both* steels and carbides. Tool steel shanks and Firthite Carbide inserts are perfectly matched by one manufacturing source for maximum quality."

R-309 R3

Firth Sterling

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High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

News Briefs *(from p 135)*

The Big Sandy-Elkhorn Coal Mining Institute in Pikesville, Ky., awarded two member companies safety citations. J. H. Mosgrove, the Institute's secretary-treasurer, said the awards were made to Princess Elkhorn's mine in David, Ky., and Inland Steel Company's No. 1 mine at Price.

The East Broad Top Railroad, the only narrow gauge railroad east of the Mississippi, lost its last customer after 100 yr of operation. The customer, Rockhill Coal Co., notified the railroad that it was shutting down all operations. The railroad operated over 32 mi of winding mountainous country in Huntingdon, Fulton and Bedford Counties in south-central Pennsylvania.

The electric power generating capacity of Alabama Power Company's three thermal power stations in Gorgas, Ala., will be increased to 711,250 kw in 1957 after a 165,000 kw steam turbine-generator has been installed. The turbo-generator is being manufactured by a General Electric department in Schenectady, N. Y. Steam will enter the turbine at 1,800 psig at 1,000 deg F.

Bear Canyon Coal Co., Trinidad, Colo., won a $17,705 judgment in Denver's federal district court March 30 from District 15, UMWA, for breach of contract. The company charged in its suit that the UMWA had broken a collective bargaining contract and had gone on strike. The controversy began when Bear Canyon Coal refused to reinstate Pete Santistevan, a miner and UMWA secretary on the payroll. Mr. Santistevan left his job because of illness in 1951, sought re-employment again in 1952. The mine was shut down from Dec. 17, 1952 until Apr. 23, 1953.

EQUIPMENT APPROVALS

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in March as follows:

Schroeder Bros. Corp.—Model UT-20C utility truck; one motor, 7½ hp, 230 v, DC. Approval 2-1134, March 1.

Joy Mfg. Co.—Type RBD13 roof-bolting, timbering, drilling machine; one motor, 26 hp, 230-500 v, DC. Approvals 2-1135 and 2-1135A, March 12.

Goodman Mfg. Co.—Type 93-96 rope belt conveyor. one motor, 25 hp, 230 v, DC. Approval 2-1136, March 22.

Goodman Mfg. Co.—Type 9668 loader; four motors, two 15 hp and two 20 hp, 230 v, DC. Approval 2-1137.

The Long Co.—Model W400 conveyor; one motor, 10 hp, 230 v, DC. Approval 2-1138, March 28.

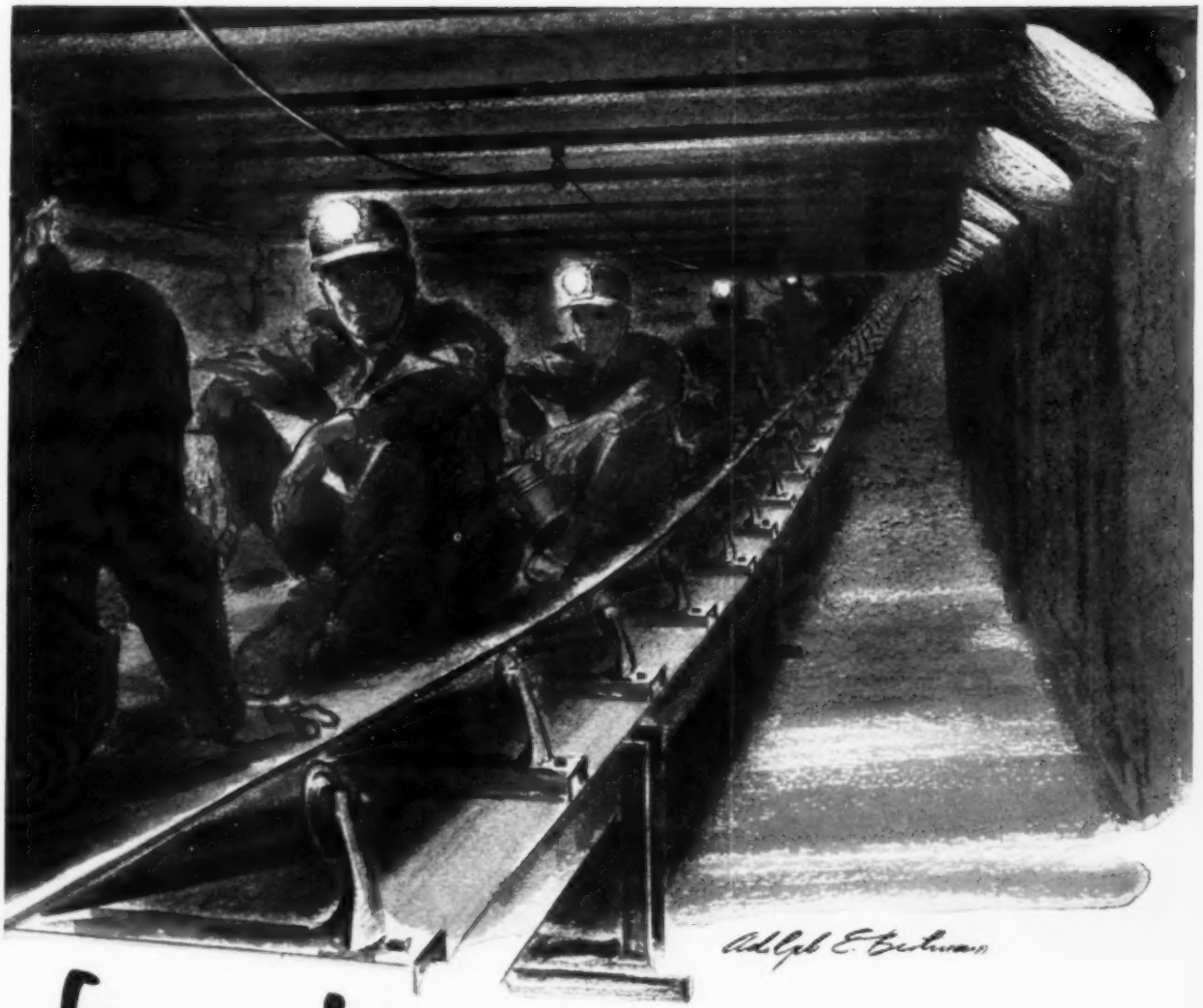
Magic carpet

Traffic jams, crowded cars, waiting for cages when changing shifts will be a thing of the past in the Crichton Number 4 Mine of Johnstown Coal & Coke Company. For with the introduction of the new Hewitt-Robins MAN-VEYOR, miners will ride smoothly and safely deep into the earth at the rate of one every 4 seconds. Instead of men piling up at the shaft head waiting for the elevator, incoming and outgoing shifts will be speedily transferred in a steady stream on this reversible man-carrying belt conveyor.

The new Hewitt-Robins MAN-VEYOR is essentially a standard 26"-wide mine conveyor. Special safety features such as oversized heavy-duty drives, end booms for loading and unloading of men, and a nonskid belt design have been added. The entire system is designed to operate in perfect safety for the transportation of personnel at a speed of 150 feet per minute. Allowing 10 feet per man, this provides a ca-

HEWITT-ROBINS INCORPORATED

CONVEYOR BELTING • INDUSTRIAL HOSE • CONVEYOR MACHINERY • VIBRATING SCREENS • VIBRATING CONVEYORS



for miners...

pacity of 900 men per hour. This unique installation of a belt conveyor is one more example of the way in which Hewitt-Robins has maintained leadership in mechanization within the mining industry. For wherever coal is handled in bulk, from face through preparation plant, you will find a specially designed Hewitt-Robins belt conveyor system to handle the job more efficiently and economically.

Although Hewitt-Robins is known primarily as the manufacturer of complete belt conveyor systems (both belting *and* machinery), we eagerly accept the challenge of solving any unusual problem in bulk materials handling. Hewitt-Robins has unequaled background in all phases of design, engineering and manufacture of such systems to answer your particular materials handling problem. For complete information about Hewitt-Robins products and services, contact our nearest sales office, your local Hewitt-Robins distributor or write to our executive offices in Stamford, Connecticut.

STAMFORD, CONNECTICUT **Hewitt-Robins**

DESIGN, MANUFACTURE, ENGINEERING AND ERECTION OF COMPLETE BULK MATERIALS HANDLING SYSTEMS

Personal Notes

Roland C. Luther, executive vice president of Peerless Coal & Coke Co., Bluefield, W. Va., announced last month that B. Arnold Workman, former general manager of mines, had been appointed Peerless general manager. The appointment was effective in March.

At the same time of the promotion announcement, Mr. Workman, as general manager, announced a series of promotions of his own. Boosted were: **P. Z. Rutschow,** who moved from superintendent to general manager's assistant; **Vance Price,** from chief engineer to superintendent of mines; **Curtis Collins,** formerly chief electrician of Lorado Coal Mining, Lorado, W. Va., and the Amherst Coal Co., Lundale, W. Va., to superintendent of maintenance; **Luther Adkins,** from general works foreman No. 4 mine to mine foreman of Nos. 6 and 7; and **Frank Hubbard,** from section foreman No. 4 mine to general works foreman of No. 4 mine.

Mr. Workman joined Peerless, which operates in Vivian (McDowell County), W. Va., in November, 1955. Prior to November he was a general superintendent for Lorado. In his rise through the ranks he has been section foreman, mine foreman, assistant superintendent and general superintendent.

Mr. Rutschow began working for Peerless in 1950 as chief engineer and was promoted to superintendent of mines in 1955. For a number of years after World War II he was assistant superintendent of the Tralee and Marytown mines owned by Semet-Solvay Div., Allied Chemical & Dye Corp.

Mr. Price, formerly an assistant superintendent for the Boone County Coal Corp., was hired by Peerless in July, 1955.

E. Minor Pace, former mine superintendent, has been named general superintendent by Inland Steel Co., Wheelwright, Ky. The announcement was made last month by H. O. Zimmerman, manager of coal properties. A graduate of Virginia Polytechnic Institute and West Virginia University, Mr. Pace has held the posts of transitman, superintendent of Inland's Price preparation plant, mining engineer and mine superintendent. As general superintendent he will be responsible "for all activities connected with coal production," Mr. Zimmerman said.

John Mayhew and L. M. Rayburn, Knoxville, Tenn., have been promoted vice-presidents of the Blue Diamond Coal Co. in Knoxville. Mr. Rayburn was a former store manager for the company in their plant at Blue Diamond, Ky. Mr. Mayhew has been connected with the company in different capacities for many years.

Henry F. Warden, president of the American Coal Co., McComas, W. Va., has been elected a vice president of the Pocahontas Fuel Co.

Rodney E. Sachs has been appointed a vice president of the Boone County Coal Corp., Philadelphia, Pa. Boone County has general offices and mines in West Virginia.

Obituaries

Harry M. Moses

Harry Morgan Moses, Labor Peacemaker, Dies

Harry M. Moses, bituminous management spokesman, whose man-to-man contract negotiations with John L. Lewis and the United Mine Workers, achieved 5 yr of labor peace, died April 1 in Doctors Hospital, Washington, D. C. He was 59.

As president of the Bituminous Operators Association, Mr. Moses had negotiated three industry-wide contracts with the UMWA since 1951 without the threat of a walk-out. His successful contract talks with Mr. Lewis brought to a close the 5-yr period following World War II that had seen nine strikes and work stoppages. Only last fall he and Mr. Lewis had agreed on a pay increase totaling $2 a day for 200,000 miners. The final installment of the increase (80 cents) became effective last month.

Born in Westerville, Ill., in 1896, Mr. Moses attended Wabash College and worked during summer vacations at one of the properties of the United States Fuel Co. near Westerville. Vacation work continued around the mines until 1917, when he was employed at the Middlefork Mine of the United States Fuel Co., Benton, Ill. After serving a year in the army (1918-1919) he began work for the Tennessee-Illinois Phosphate Co., Centerville, Tenn. The following year, 1920, he returned to Middlefork as foreman.

From 1923 to 1927 he was first assistant mine manager, later became mine manager of the United States Fuel Co.'s Bunsenville Mine, Georgetown, Ill. In 1927 he was made superintendent of the

How to cut mining maintenance costs

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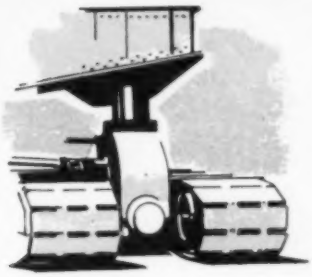
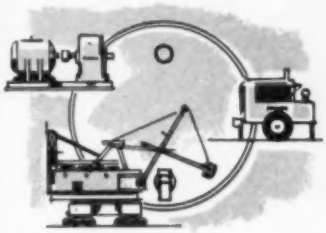
1 **Reduce oil inventories**

STANOIL Industrial Oil can be used in so many places that you can reduce inventories of special oils. Add to this the economy of simplified storage and handling. Use STANOIL Industrial Oil in electric motors, air compressors, fans, blowers, transmission and clutch lubrication, and hydraulic systems. Use STANOIL to lubricate bearings either in direct application or in oil circulating systems.



2 **Get better lubrication**

Special solvent-refining techniques plus the blending in of exclusive additives make STANOIL the finest industrial oil. STANOIL resists chemical change . . . lubricates effectively and completely over a wide temperature range . . . cuts wear. It protects oil systems from troubles due to carbon deposits, corrosion and emulsion. It stands up under heavy and repeated shock loads. STANOIL has high oxidation stability and extremely low carbon forming tendency.



3 **Prevent application mistakes**

When there is only one lubricant, there can't be any chance of the wrong one being used. With STANOIL, errors in application that would result in breakdowns are eliminated; equipment stays in service longer; maintenance is easier; overhauls go more smoothly and equipment is back in service faster.

Get more information about STANOIL Industrial Oil. Call your Standard Oil industrial lubrication specialist. He is experienced in mine lubrication. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

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Quick Facts About

STANOIL Industrial Oil

- **Stability**—STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- **Rust Prevention**—The inhibitor in STANOIL "plates out" on metal surfaces, prevents corrosion.
- **Cold Starts**—STANOIL has low pour point. Flows freely from cold start. No need for costly warm-ups.
- **Resists Effects of Temperature Change**—STANOIL has high viscosity index, resists temperature change.
- **Has Excellent Demulsibility**—STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.

Obituaries *(from p 148)*

Bunsenville Mine and Vermilion Mines. In 1933 he became assistant general superintendent for U. S. Coal & Coke Co., West Virginia Div., with headquarters in Gary, W. Va. A year later he became general superintendent. By 1935 Mr. Moses was appointed general superintendent of the Kentucky Div., in addition to the West Virginia Div. He became president of the H. C. Frick Coke Co. and other subsidiaries of U. S. Steel in 1938.

Harry Moses headed the subsidiaries until 1950 when he became president of the Bituminous Operators Association. During the 1940's he had represented mines operated by the U. S. Steel in union contract conferences and had achieved a reputation as an able negotiator. He agreed to head the Operators Association because, as he said, "Both the industry and the United Mine Workers had leadership with sufficient wisdom to solve their own mutual problems without making a public spectacle of their dealings or calling on a politically minded government for help."

In the '40's the United States Steel mines had been the last of those dealing with the UMWA to accept the union shop clause. Mr. Moses accepted it in compliance with the decision of an arbitration board.

Glenn A. Shafer, 67, a former coal mine operator in Illinois for many years, died late in March in Pana, Ill. Mr. Shafer formerly owned and operated mines in Moweaqua, Assumption and Pana. He was the owner of the Moweaqua mine when 54 miners were killed in an explosion on Dec. 24, 1932. He was general manager of the Pana Coal Co. until 1945 when it was sold. Since then Mr. Shafer had been employed as a mining engineer. For many years he had been a secretary of the Illinois Coal Producers Association.

George H. Esser, president of the Virginia Coal Operators Association, died in Norton, Va., March 27. A graduate of Virginia Military Institute, Mr. Esser joined his father, John A. Esser, in the management of the Colonial Coal & Coke Co., Dorchester, Va. Later, he managed the Esser Coke Co., Esserville, Va., and was elected secretary of the Virginia Coal Operators Association in 1935. In 1943 he was elected president of the association. Father and son achieved a degree of fame in the earlier part of this century with the production of a high-grade coke.

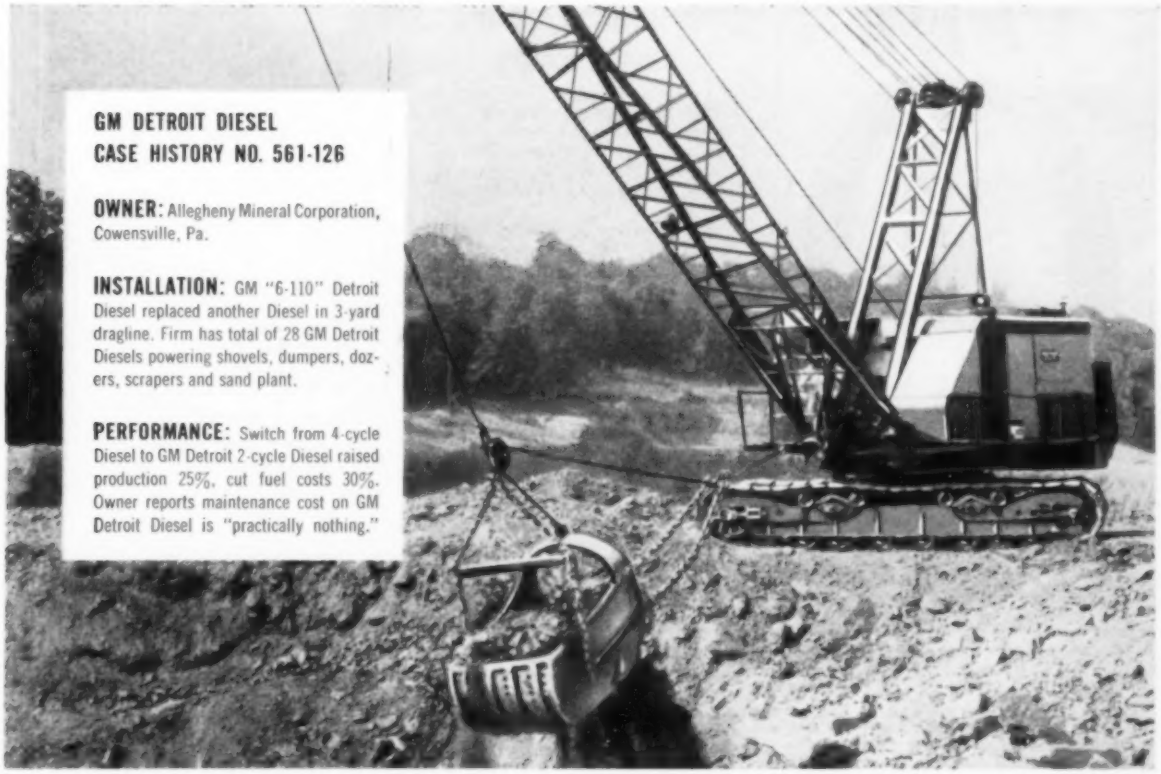
Frank A. Hunter, 69, a former vice-president of the W. G. Duncan Coal Co. in Kentucky, died March 28 in Hollywood, Fla. Mr. Hunter retired in 1952 because of ill health.

Charles S. Hall, once associated with the Pennsylvania Coal Co. and with Pattison & Browns, Inc., died April 1. Mr. Hall, upon his retirement from Pennsylvania Coal in 1950, had completed 50 yrs of service.

(Continued on p 152)

Production Up 25%
Fuel Costs cut 30%

Since He Switched to GM Detroit Diesel Power



GM DETROIT DIESEL
CASE HISTORY NO. 561-126

OWNER: Allegheny Mineral Corporation, Cowensville, Pa.

INSTALLATION: GM "6-110" Detroit Diesel replaced another Diesel in 3-yard dragline. Firm has total of 28 GM Detroit Diesels powering shovels, dumpers, dozers, scrapers and sand plant.

PERFORMANCE: Switch from 4-cycle Diesel to GM Detroit 2-cycle Diesel raised production 25%, cut fuel costs 30%. Owner reports maintenance cost on GM Detroit Diesel is "practically nothing."

PRODUCTION UP, fuel costs down, maintenance expense slashed—that's what hundreds of operators report after their switch to General Motors Detroit Diesel power.

And the reason is clear.

They get extra production with a GM Detroit Diesel because a 2-cycle engine delivers twice as many piston power strokes per crankshaft revolution as a 4-cycle engine.

They pile up worth-while records of fuel saving as evidenced by this Pennsylvania user's report—so typical of others who are profiting by switching to Detroit Diesel engines.

And one reason maintenance costs drop is that GM Detroit Diesel parts cost less. For example, valves, pistons, rings, liners, bearings and other replaceable parts cost less than for most other Diesels.

But get the full story on GM Detroit Diesel power from your GM Detroit Diesel distributor or dealer. Call him today—or write direct.

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Your GM Detroit Diesel is built for a lifetime of hard work. But you'll get better service from your engine if you have your GM Detroit Diesel distributor or dealer set up a preventive maintenance program for you. Call him today and remember—Preventive Maintenance Doesn't Cost, It Pays.

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America's Largest Builder of Diesel Engines

Single Engines . . . 30 to 300 H. P. *Multiple Units . . . Up to 893 H. P.*

Obituaries *(from p 150)*

Luther C. Brewer, 47, a small mine operator in Lee County, Ky., was killed in a slate fall in his mine near Beattyville and Winchester, Ky., March 26.

James Wesley Hanson, 82, of Queen Shoals, W. Va. and co-owner of J. W. Hanson and Son Coal Co., died in Charleston, April 9.

Association Activities

Henry F. Warden, president of the American Coal Co., was re-elected president of the Pocahontas Operators Association, Bluefield, W. Va., during the association's annual meeting in New York March 30.

G. A. Shoemaker, Pennsylvania coal executive (Pittsburgh Coal, Pitt Consol, Mathies, Harmar Coal) was elected president of the Western Pennsylvania Coal Operators Association at the annual meeting in Pittsburgh.

MEETINGS

American Mining Congress; Coal Convention, May 7-9, Hotel Netherland Plaza, Cincinnati, Ohio.

"Nucleonics" and Armour Research Foundation's Industrial Nuclear Technology Conference; May 15-16, Armour Research Foundation, Chicago, Ill.

Central Appalachian Section, AIME, spring meeting, May 19-20, Abingdon, Va.

Bluefield Coal Show, May 23-25, N&W Terminal, Bluefield, W. Va.

Mine Inspectors' Institute of America; Annual Convention, June 4-6, Deshler Hilton Hotel, Columbus, Ohio.

Open Pit Mining Association; 12th annual meeting, June 7, Bradley University, Peoria, Ill.

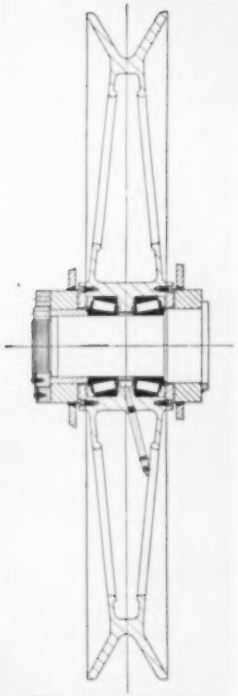
National Coal Association; Convention, June 13-14, Shoreham Hotel, Washington, D. C.

National Mine Rescue Association, Benton, Ill.; spring meeting, June 16, West Frankfort Country Club.

Rocky Mountain Coal Mining Institute; 52d regular meeting, June 17-20, Hotel Colorado, Glenwood Springs, Colo.

West Virginia Coal Mining Institute; spring meeting, June 22-23, Prichard Hotel, Huntington, W. Va.

Coal Conference; Gordon Research, American Association for the Advancement of Science, July 2-6, New Hampton School, New Hampton, N. H.



How **THE MARION POWER SHOVEL COMPANY** mounts sheaves on Timken bearings . . . to take radial, thrust loads in all combinations, keep heavy-duty sheaves in positive alignment.

World's largest shovel scoops 90 tons, lifts it 10 stories moves it 290 feet on 34 TIMKEN® bearings

BUILT by the Marion Power Shovel Company, this gigantic "coal miner" moves many tons of overburden per hour for the Hanna Coal Company. With 10 motors controlling the digging cycle of the 90-ton capacity dipper—an additional 4 motors for its 8 powerful cat treads—built-in elevator—auxiliary crane for hoisting equipment aboard—this tremendous earth mover is 100 times larger than the ordinary construction shovel.

34 Timken® tapered roller bearings carry terrific radial and thrust loads in all combinations, at critical points—including swing machinery and all hoist sheaves. Full line contact between rollers and races gives extra load-carrying capacity. And because Timken bearings have case-carburized rollers and races—shock-resistant cores under hard, wear-resistant surfaces—they take heavy shock loads. Designed to roll true, precision manufactured to live up to their design, Timken bearings practically eliminate friction, reduce wear on integral parts. Closures are more effective, too, because Timken bearings keep housings and shafts concentric, keeping lubricant in, dirt, dust, water out.

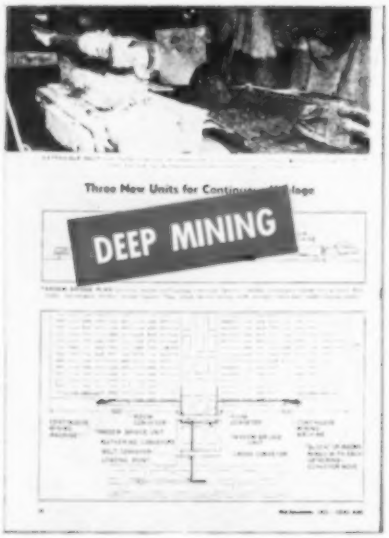
When you buy or build machinery, look for the "TIMKEN" trade-mark on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

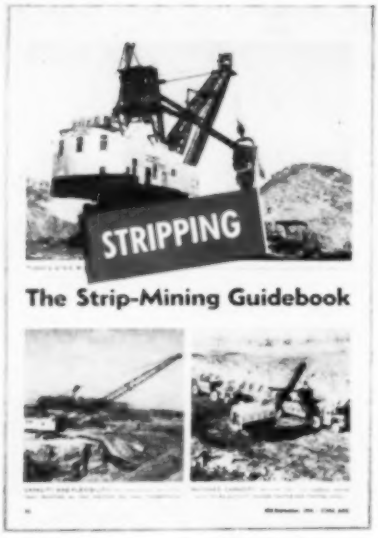
This symbol on a product means its bearings are the best.

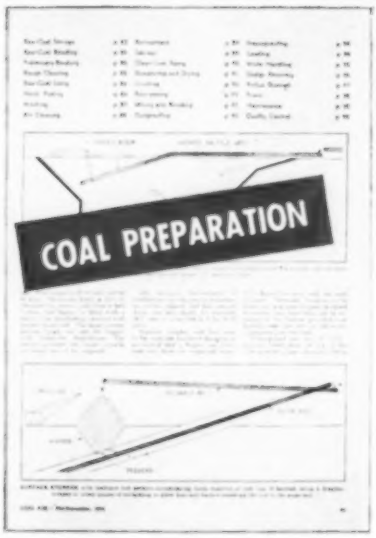
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD







No Matter What Your Job, You'll Find...

The COAL AGE Mining Guidebook and Buying Directory Issue is a useful, practical working manual

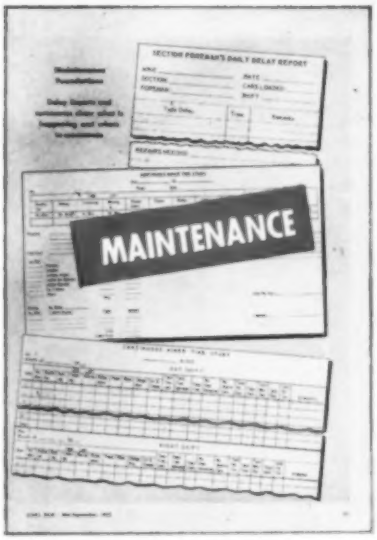
The largest, most complete single source of information on current mining practice available anywhere, the COAL AGE "Guidebook" will help you develop new ideas, a fresh slant on operating problems, the latest mining methods and equipment.

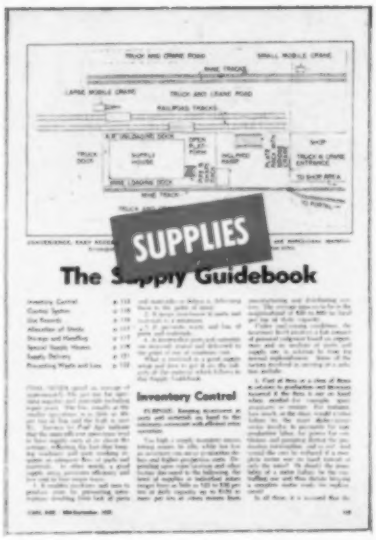
The new COAL AGE Mining Guidebook and Buying Directory Issue was inaugurated to serve you as a practical on-the-job reference manual on all phases of modern mine operation. You'll find it a helpful timesaver, whether you have a definite problem, are seeking to improve your methods or are planning a new installation.

Ideas are the backbone of mining progress. New techniques, changes in methods, improved equipment are important. Used consistently, the COAL AGE Guidebook can help you keep up on what's going on. It's a good starting point for developing new ideas . . . a sure way to broaden your personal horizon.

The 1955 Guidebook – complete in one volume – outlines the basic mining principles you have to deal with . . . summarizes current operating practice and results at hundreds of efficient, low-cost mining properties. The 42-page Buying Directory, together with manufacturers' advertising, will help you locate equipment, materials and services geared to your particular needs.

The 172-page Guidebook section – about 2½ times the size of the usual COAL AGE issue–is the largest single editorial section ever published in any coal mining publication. It's the only up-to-date, complete guide to mine operation published today. In fact, COAL AGE Editors developed the idea for this additional issue just because hundreds of mine officials told us they needed and wanted such a practical reference manual. Its potential usefulness to you is indicated by subscribers' typical comments quoted here.





HOW SOME COAL AGE SUBSCRIBERS ARE USING THE GUIDEBOOK

"Solved our belt brake problems (Thanks). Also our roof bolt problems. We found the right shuck in . . . Steel Co. To date, it has solved many problems for us in auger mining, roof bolting, preparation, etc. We have found great use of it in our many truck mine operations. I have no comments as of now how to improve the edition. But we congratulate you and a wonderful staff for a very, very fine job."

General Superintendent, Kentucky

"At our mine we have a very peculiar roof condition. It varies in nearly every section. We are trying roof bolting and this part of the Guidebook has given us some ideas. I would say that it is very useful. More information on extensible belts, continuous miners and proven methods of keeping these machines on sights. We are putting in these machines and this is one of the big problems."

Mine Engineer, Illinois

"Have used it on preparation problem. It is very useful in its assembly of material. It should be of continuous usefulness as new problems arise."

Preparation Manager, Pennsylvania

Guidebook of help on "Face preparation and roof control. This Guidebook is very useful to me. We are planning a new operation and the Guidebook covers every possible phase."

Owner, Ohio

"Have used Buying Directory. I think the idea of consolidating leading articles and other data in an annual number is of much value to the industry. It has always been a problem to keep tear sheets and this seems to be a good solution for ready reference."

Consulting Engineer, Kentucky

Guidebook of help on "Power service for coal preparation plants, screening and sizing."

Assistant to President, Virginia

"My frank opinion on the new COAL AGE Mining Guidebook and Buying Directory . . . I like it and I believe that we will find it useful. You have formed a very worthwhile habit of doing everything just a little better than it has been done before, and I admire your capacity for doing it."

President, Indiana

New Edition Coming to All Subscribers

COAL AGE's Mining Guidebook and Buying Directory Issue is an established annual service provided subscribers at no additional cost. The 1956 edition, completely revised and up-dated, will be published in Mid-July, 1956.

Among the Manufacturers

SITES OF FOUNDRY (A) and manufacturing facilities (B) in Indianapolis, Ind., where Link-Belt plans to spend $3½ million on expansion of its Ewart plant. Present foundry occupies site marked "B," but will be razed to make way for new manufacturing facilities by 1958.

Hulbert Oil & Grease Co., Philadelphia, Pa., has erected new buildings and installed additional equipment that the company says will boost production capacity 75%. The company reports that a "growing demand" for its coal mine lubricants was the reason for the expansion. W. Stuart Emmons, executive vice president, says that sales for the first quarter of 1956 are up an estimated 45% over last year's quarter. The new buildings, he said, are expected to be operating at full capacity by the end of 1956. No construction costs were announced by the company.

A new plant that is expected to triple the production of the SpeedWay Mfg. Div., Thor Power Tool Co., Aurora, Ill., was announced by the company's president, Neil C. Hurley, Jr. The plant will manufacture SpeedWay fractional horsepower electric motors in a 1-story building constructed on a 15-acre site in LaGrange Park, Ill., a Chicago suburb. Occupancy is slated for early 1957. SpeedWay also expects to move all its administrative facilities to the new building.

Crane Carrier Corp., Tulsa, Okla., manufacturer of heavy duty off-the-road trucks, has merged with Standard Industries, Inc., Pa. The merger adds working capital to Crane's plant expansion program now in progress. The company makes 74 models of crane carriers with capacities from 10 to 35 tons.

To bring information on Cummin's diesels directly to servicemen, the Service Div., Cummins Engine Co., Columbus, Ind., has sent a "Mobile Diesel Center" on the road. In a 50-min program di-

rected to owners, maintenance superintendents, shop foremen, drivers and safety supervisors, the company will demonstrate factory service methods. An audience of some 10,000 is expected to attend the mobile programs in the next 12 mo.

William F. Hoskinson has been appointed sales engineer of the Connellsville Mfg. & Mine Supply Co., Connellsville, Pa. Mr. Hoskinson was formerly with the Treadwell Construction Co.

General Electric's $7 million motor-manufacturing plant in Schenectady, N.Y., was unveiled to shareowners last month for the first time. The plant is designed to mass-produce 7½ to 30 hp motors on an assembly line basis. Push

We'll show you how to cut your lubrication cost per ton of coal!

The American Oil Company has a special staff of expert mine lubrication engineers to help you solve your lubrication problems. One of them will gladly make a lubrication survey for you at no cost to you. His aim will be to simplify the number of lubricants you need, and to reduce your maintenance costs. He will give your mine machinery better lubrication with such famous Amoco products as Paramo Oils, Amolite Oils, Amoco Leaded Lubricants, and Amerilube Greases. Call the nearest Amoco office.

AMOCO LUBRICANTS

. . . SURE • SAFE FOR MINE MACHINERY

AMERICAN OIL COMPANY AMOCO

JOY Safety Circuit Centers (S.C.C. units) are the Mining Industry's most inexpensive insurance against the damages that electrical overloads, shorts and ground leaks inflict on men, machines and trailing cable. Supplied with one through four power feeder outlets, in a wide variety of A.C. or D.C. ratings to match both low and high vein mining requirements.

- **Available in "Dust-resistant" or "explosion-tested" housings**
- **Compact construction utilizes aluminum to reduce weight**
- **Power outlets individually protected by circuit breakers**
- **External arms reset breakers, turn current off and on**
- **Safety ground trip provides insulation failure protection**
- **ISC Circuit (*) permits approved cable sectionalization**

Note: Explosion-tested designs have been approved for use in gaseous atmosphere by the U. S. Bureau of Mines and they stay permissible in operation; i.e., no protective covers or fuses must be removed or replaced. Simple movement of outside breaker control handle restores protected power to machinery after fault has been corrected. (*)*ISC Circuit is optional on all designs.*

WRITE FOR BULLETIN

Yours without obligation . . . Eight pages of illustrations and descriptions.

Ask for Bulletin B39A

PROVIDE GROUND FAULT PROTECTION

Specially designed, foolproof core balance type ground protection available on all A.C. JOY S.C.C. units. Adjustable relay type available on D.C. units. Cuts power off lines when insulation failure permits dangerous flow of current to ground.

DECREASE FIRE HAZARDS

Circuit breakers cut current off feeder cable and machinery *in a split second* when dangerous shorts occur, preventing cable and machine insulation fires.

GUARD AGAINST EXPLOSIONS

JOY permissible style S.C.C. units (described at left) confine circuit breaking arc inside explosion-tested compartments. Available with intrinsically safe control (ISC) circuit that makes JOY connectors automatically drop load in opening process.

JOY MANUFACTURING COMPANY

General Offices: Oliver Building Pittsburgh 22, Penna.

In Canada: Joy Manufacturing Co., (Canada) Ltd., Galt, Ont.

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

WAD CL5630

buttons control machining, assembling and testing, but the company says that "more personnel than ever before" will be needed because of a large expansion in the motor market expected by GE.

Books for Coal Men

Excavating

Modern Techniques of Excavation, by Herbert L. Nichols, Jr. provides complete information about the planning and practice of dirt and rock excavation and grading. Prepared to meet the special needs of planning and field men in contractor and engineering companies, the book describes each type of job the earthmover must do, the problems that arise and how to solve them. *608 pp. 6⅝x9⅝-in; cloth. $9, North Castle Books, 212 Bedford Road, Greenwich, Conn.*

Fuels Yearbook

Minerals Yearbook, Vol. II, 1953 provides a comprehensive review of the fuel industries, including overall and statistical summaries, and employment and injury data. *478 pp. 6x9¼-in; cloth. $2.25, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Ohio Coal

Petrographic Characteristics of the Meigs Creek No. 9 Coal, by Gilbert H. Cady and Gilbert E. Smith. Report of investigations No. 27. This is the first report on the petrographic characteristics and physical composition of Ohio branded coals. *97 pp. 8½x11-in; paper. $1, Division of Geological Survey, Orten Hall, The Ohio State University, Columbus 10, Ohio.*

Coal Heat for Schools

Automatic Coal Heat for the Nation's Schools is a 62-page booklet on the economy of coal in modernizing heating plants in schools in many states. A special feature is a section with detailed plans for coal-burning plants in sizes common to most schools. Available from the *National Coal Association, Southern Building, Washington, D. C.*

Other Books and Booklets

Fire and Explosion Hazards in Coal-Drying Plants. *R. I. 5198, U. S. Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Corrosive and Erosive Effects of Acid Mine Waters on Metals and Alloys for Mine Pumping Equipment and Drainage Facilities; Anthracite Region of Pennsylvania. *USBM Bulletin 555. 70¢, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Geology and Mineral Fuels of Parts of Routt and Moffat Counties, Colorado, by N. Wood Bass, J. Brian Eby and Marius R. Campbell. *Geological Survey Bulletin 1027-D. $2.25, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

A MESSAGE TO AMERICAN INDUSTRY • FIRST OF A SPECIAL SERIES

THE SHORTAGE OF SCIENTISTS AND ENGINEERS:

How Critical Is It?

The United States is running into a serious shortage of scientists and engineers. There is no novelty in this observation. It has often been made in the last few years. And there has been mounting alarm about what this shortage may mean for both our national security and our prosperity.

There would be great novelty, however, if general agreement were attained on such important matters as the size of the shortage, the extent of the damage it threatens to inflict, and the best ways to eliminate it. The purpose of these editorials is not to provide this novelty, but to ventilate some of the key aspects of the shortage of scientists and engineers.

This first editorial in the series is designed to throw light on the over-all dimensions of the shortage. Others to follow will be addressed to such questions as:

- How serious is the threat to our economic well-being and to our national security?
- What needs to be done to prevent the shortage from becoming critical?

Rise Has Been Rapid

The problem is *not* that we have been producing a small number of engineers and scientists. Indeed, the number has risen sharply. We now have a working force of more than 600,000 engineers, over twice as many as the 286,000 there were in 1940. And we have about 250,000 scientists (chemists, physicists, biologists, geologists, mathematicians, etc.), compared to only 92,000 in 1940. About one in 148 persons in the labor force of 1940 was a scientist or engineer; today the ratio is about one in every 80.

In research and development work, where highly creative scientific minds are required, there has been fully as rapid a rise in employment of scientists and engineers. Fewer than 90,000 were employed in research and development fifteen years ago; the total now exceeds 200,000.

—But Not Rapid Enough

Despite this rapid increase in the number of scientists and engineers—at a rate much faster than the increase in the labor force as a whole—the needs of industry, government and education for technically trained people have risen even more sharply.

The principal reason for this mounting demand is the prodigious growth of research in the last 15 years. From a total of only about $900 million spent on all types of research in 1941, the annual expenditure rose to over $5 billion by 1953 (the latest estimate available). Over two-thirds of the research is done by private industry, mostly to develop new and better products and to find new and better methods of production. Most of the rest is performed by the government, largely to develop improved and inevitably more complex scientific weapons.

One aircraft company has found from its own experience that it required 17,000 engineering manhours to develop a typical fighter plane in 1940. The requirement is now about 1.4 million engineering manhours. Development of the typical fighter plane of 1960 will require well over 2 million engineering manhours.

In this dramatic example, the need for engineering services for a basic piece of military equipment soared 80 times in 15 years. It is an indication of why the demand for more and more technically trained men and women has outstripped even the imposing increase in scientific and engineering manpower of the last decade and a half.

Size of the Gap

Exactly how great the gap is between the available supply of scientists and engineers and the number required, it is impossible to say. In some instances technical talent undoubtedly could be better used than it is now. And part of the shortage might "disappear" if higher salaries had to be paid. (These questions will be discussed in later editorials.) But informed estimates of the approximate size of the gap can be given.

- According to the best available information, from estimates by the Engineers' Joint Council and the U. S. Bureau of Labor Statistics, **the minimum need for engineers from graduating classes is 40,000 each year for the next ten years.** Last year we graduated only 23,000 engineers, just about enough to cover replacement needs without allowing for any expansion of the number of active engineers. Projections made by the U. S. Office of Education indicate that we shall probably not have a class of 40,000—the *current* annual requirement—until 1963.
- According to Dr. Howard Meyerhoff, executive director of the Scientific Manpower Commission, **there is now a shortage of about 20,000 scientists.** Last year the number of doctoral degrees in the natural sciences, almost a prerequisite for research work, was only 5,000. Dr. Meyerhoff estimates that the shortage of scientists will rise another 30,000 by 1960.

More Needed As Teachers

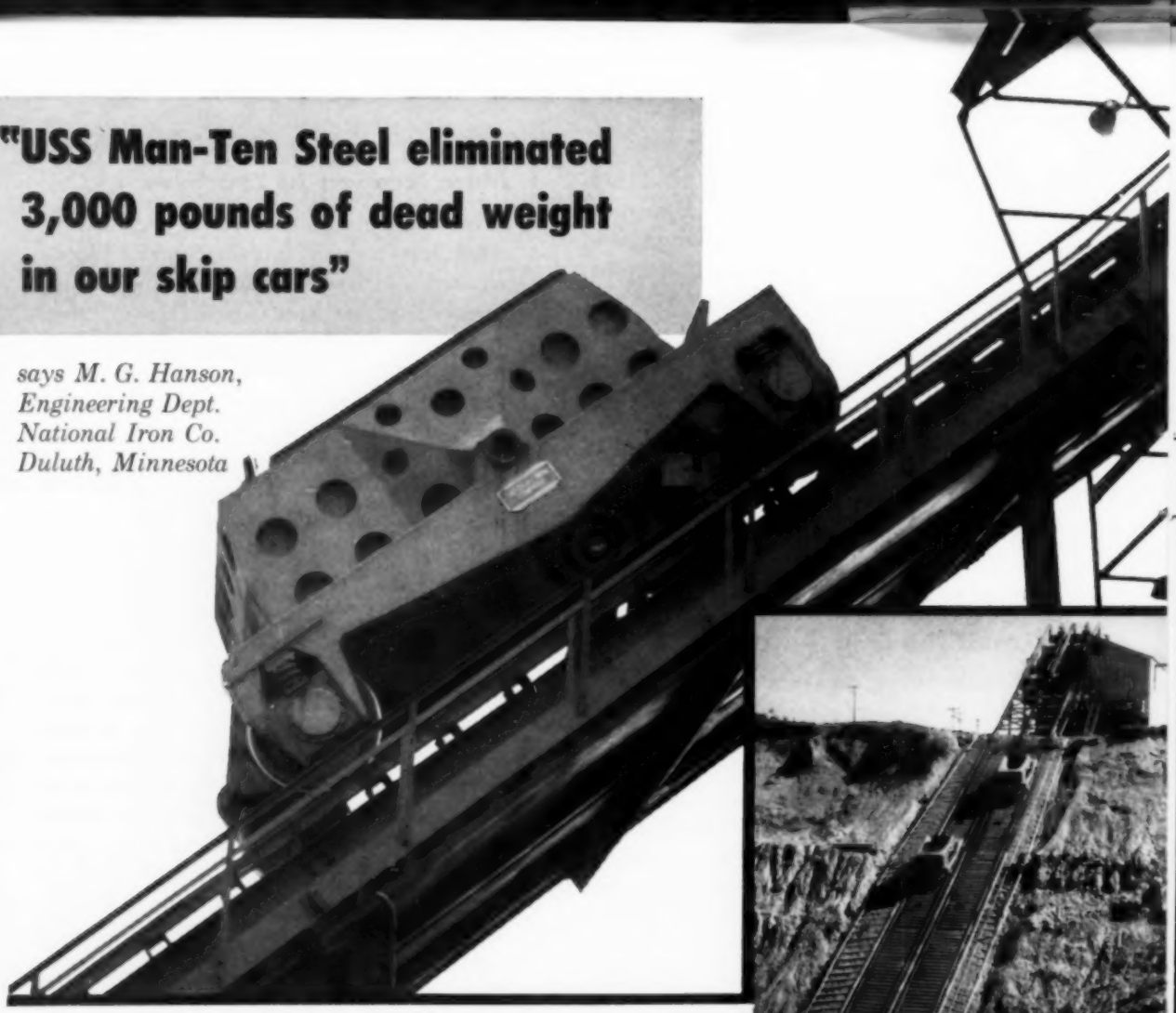
Not all of the graduates with scientific and engineering training, furthermore, will work as scientists and engineers—that is, by performing research and giving it practical application. Such training is now necessary in many sales and management positions. And more of our technically trained men and women must remain in educational institutions as teachers if the quality of engineering and scientific education is to be maintained. A survey in 1954-55 by the National Education Association showed that, out of 277 universities, state colleges and large private colleges, nearly one-third *already* had unfilled vacancies in engineering and three-fourths had vacancies in physical sciences.

The dimensions of the shortage of scientists and engineers can be summarized as follows: **Despite a substantial rise in the trained manpower available, the needs of industry, the government and education have risen still faster. The best information indicates that, on the basis of current and anticipated needs, our recent yearly rates of production of slightly over 20,000 engineers and about 5,000 PhD's in natural sciences could be doubled without closing the gap entirely.**

The disturbing implications of this shortage for our national security and our prosperity and some practical suggestions for eliminating it will be the subjects of subsequent editorials in this series.

"USS Man-Ten Steel eliminated 3,000 pounds of dead weight in our skip cars"

says M. G. Hanson,
Engineering Dept.
National Iron Co.
Duluth, Minnesota



Rockover Skip Cars have to be tough, durable and as light as possible. They run up and down steep inclines almost continually. And because they're dump-type cars they have to resist abrasion.

"Cut down the weight of skip cars," says Mr. Hanson, "and they move faster, carry bigger payloads and require smaller, less expensive hoisting equipment. We accomplished all these things by using USS MAN-TEN Steel in our skips. Because this steel is extra strong we are able to use it in thinner sections to reduce weight, and at the same time maintain the high strength required of our heavy duty cars.

"Here are three reasons why we used USS MAN-TEN in our skip cars: it's easy to work, it's easy to weld, and it resists corrosion."

An accident proved why Man-Ten is best.

One day when a loaded car was halfway up the incline the power failed. Because the brake arrangement had not been set for automatic emergency operation the loaded car crashed to the bottom, and the empty car, used to help counterbalance the load, sailed over the top of the incline and landed 300 feet away. What happened? The loaded car suffered only a bent frame and was returned to service immediately. The empty skip was bent and distorted, but there was no breakage. After being straightened in the repair shop it too was returned to service.

United States Steel produces three different grades of USS High Strength Steel—COR-TEN, MAN-TEN and TRI-TEN – each having distinctive characteristics and each recommended for certain end uses where its specific properties will assure longer service and greater over-all economy. All three grades have a yield point 50% higher than carbon steel and all offer properties which allow greater strength and toughness to be built into the vital parts of machinery, equipment and structures most prone to failure.

In the mining industry these steels can be used to replace carbon steel in the vital parts of mine cars, dozers, shovels, draglines and other such equipment to increase service life without increasing dead weight. And if the use of thinner sections is possible, they can (1) reduce equipment weight without reducing its strength, or (2) increase the size and capacity of equipment without increasing the total weight or the power needed to move it.

For more information, write or call our nearest office.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
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UNITED STATES STEEL

SAVES ENGINES!

Use Sinclair SUPER TENOL® to save your Diesels from the harmful and costly effects of *severe* operating conditions. Sinclair SUPER TENOL is specially engineered for the tougher jobs! It saves engines by combating the effects of high temperature, over-loading, and continuous stop-and-go service. It helps eliminate deposits of varnish, carbon and sludge that impair engine efficiency. Experience shows that Sinclair SUPER TENOL keeps equipment on the job longer . . . with less wear and fewer repairs!

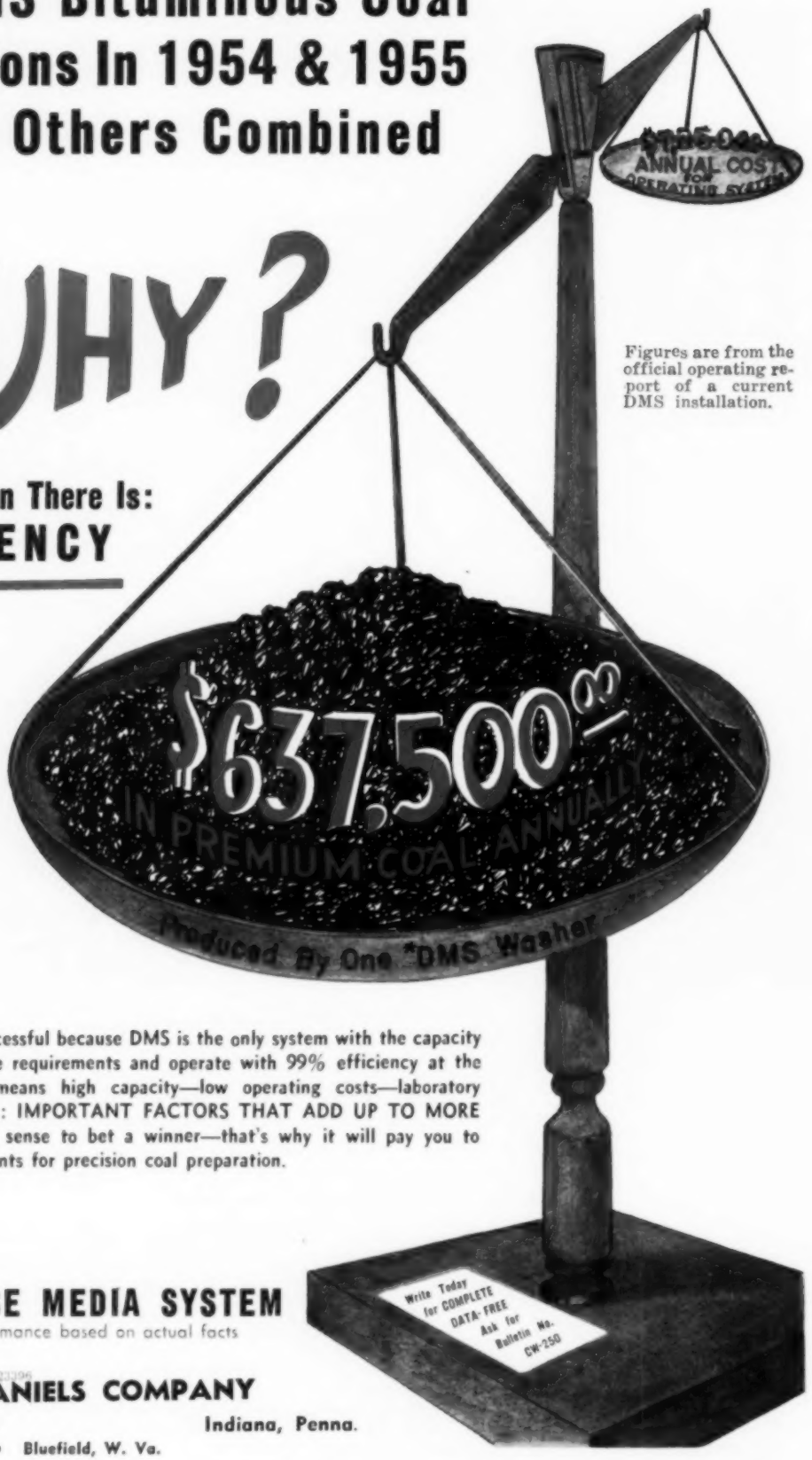
Refill now with Sinclair SUPER TENOL. Contact your local Sinclair Representative or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N.Y. *There's no obligation.*

SINCLAIR SUPER TENOL MOTOR OIL

More DMS Bituminous Coal Installations In 1954 & 1955 Than All Others Combined

WHY?

The Best Reason There Is:
EFFICIENCY



Figures are from the official operating report of a current DMS installation.

DMS Plants are successful because DMS is the only system with the capacity to meet big tonnage requirements and operate with 99% efficiency at the same time. DMS means high capacity—low operating costs—laboratory results on any seam: IMPORTANT FACTORS THAT ADD UP TO MORE PROFITS. It makes sense to bet a winner—that's why it will pay you to investigate DMS Plants for precision coal preparation.

DENSE MEDIA SYSTEM
performance based on actual facts

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Branches: Newark, N. J. • Bluefield, W. Va.

NEW-Dodge offers you a complete line of tandem-axle models

New Dodge bogie unit guarantees you maximum payload capacities!

Now you can get Dodge dependability and low operating costs in a complete line of rugged, all-new six-wheelers.

Capacity ratings range from 25,000 to 46,000 G. V. W., rear-axle capacities from 22,000 to 38,000 lbs.

High-power V-8 engines—from 201 to 220 hp.—give you more than enough power to haul the heaviest loads easily, speedily, safely.

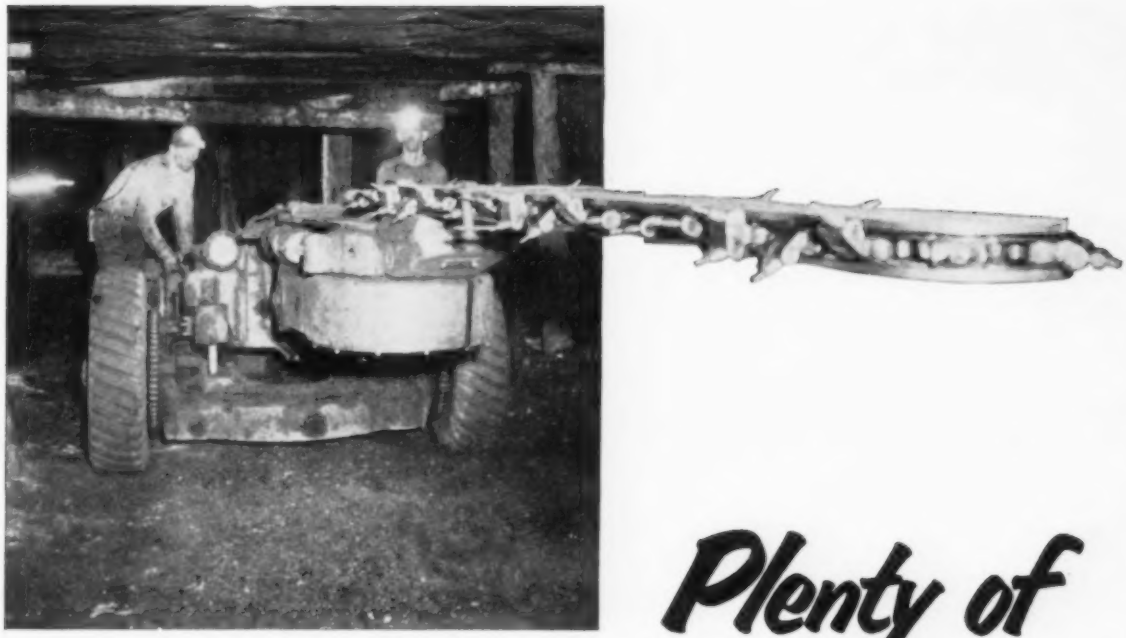
"Walking-beam" bogie keeps all eight rear tires in contact with ground at all times, minimizes bounce, increases tire mileage.

See these new V-8 Dodge tandems. Check them out against any other make and discover why they top the industry.

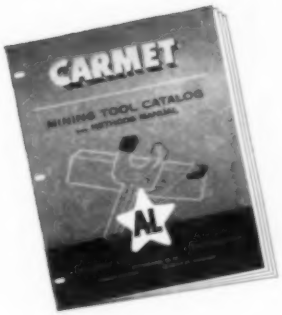
GET YOUR DODGE DEALER'S DEAL BEFORE YOU DECIDE

DODGE Job-Rated **TRUCKS**

WITH THE *FORWARD* LOOK



Plenty of Mining Experience behind these Carbide Bits



Write for your copy of the CARMET MINING TOOL CATALOG

This informative 16-page booklet gives complete data, sizes, etc. on all styles of Carmet carbide-tipped cutter and drill bits. Also included is a valuable methods manual on reconditioning methods and equipment. Your copy gladly sent free on request.

ADDRESS DEPT. CA-77

Carmet carbide bits were developed and proved *the hard way* . . . through years of service in every conceivable mining condition and in every mining area. Case histories vary considerably due to local conditions—but no matter what your cutting or drilling problems may be, we can show you records of superior performance by Carmet bits under similar circumstances.

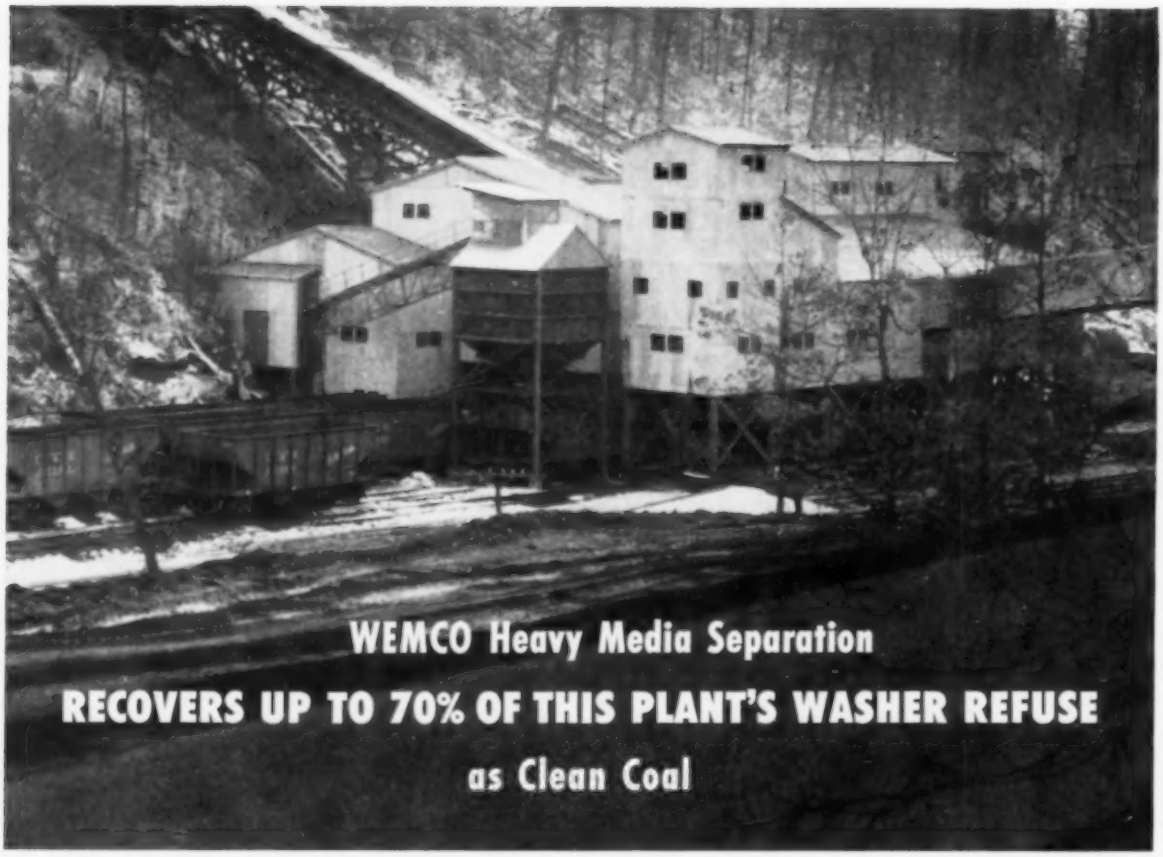
As a direct result of this field-proved background, Carmet bits offer you several distinct advantages. One is the unusually wide range of selection: 20 different styles of cutter bits, 2 styles of finger bits, 2 styles of roof bolting bits, 3 styles of auger bits. More bits to pick from means a closer match with *your* conditions—means savings for you in time and bit costs. Another advantage was *pioneered* by Carmet . . . it's the overlaying cap of steel that double-bonds each carbide cutter tip firmly in its seat, guarding against tip loss and reducing side drag and power consumption.

How about giving Carmet bits a trial? Both we and your local distributor will be glad to cooperate with you. ***Allegheny Ludlum Steel Corp., Carmet Div., Wanda and Jarvis Aves., Detroit 20, Michigan.***

The Original DOUBLE-BONDED Carbide Bit

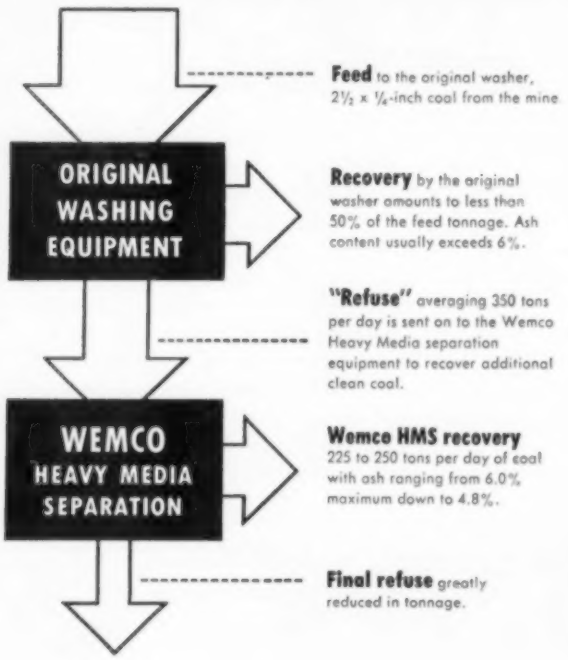
CARMET® AL

WBD 8444



WEMCO Heavy Media Separation
RECOVERS UP TO 70% OF THIS PLANT'S WASHER REFUSE
as Clean Coal

The Jewell Ridge story at a glance



Feed to the original washer, 2½ x ¼-inch coal from the mine.

Recovery by the original washer amounts to less than 50% of the feed tonnage. Ash content usually exceeds 6%.

"Refuse" averaging 350 tons per day is sent on to the Wemco Heavy Media separation equipment to recover additional clean coal.

Wemco HMS recovery 225 to 250 tons per day of coal with ash ranging from 6.0% maximum down to 4.8%.

Final refuse greatly reduced in tonnage.

"We are now recovering 225 to 250 tons per day of clean coal that was formerly lost," says the Division Engineer at Jewell Ridge Coal Company in Tilford, Kentucky.

Lab analysis at Jewell Ridge had shown a large loss of coal in the refuse of the original washing plant. A Wemco Heavy Media plant (of Mobil-Mill design) was added to treat the large volume of refuse. It was expected to recover a coal of 11 percent ash, saleable at a low price. But in actual operation, the Wemco Heavy Media equipment has been recovering 225 to 250 tons per day of coal in a range from 4.8% ash to 6.0% maximum. (Jewell Ridge Coal Company has now ordered a second Wemco Heavy Media plant.)

A Wemco HMS Mobil-Mill can earn extra profits on your mine too. Write today for full information.

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WESTERN MACHINERY COMPANY

760-G Folsom Street • San Francisco 7, California
Representatives throughout the United States and Canada and in major countries around the world.

Quality-built for dependable, high-output stripping and loading...

the big, rugged LIMA Type 2400

It takes a big, rugged machine like the Type 2400 to give you fast, dependable, high-output stripping and loading service. This heavy-duty 6 yd. shovel is quality-built by Lima to stay on the job, deliver peak operating performance on the tough assignments. It's easily convertible for dragline operation, too.

Air operated clutches make the Type 2400 easy to handle. Wide, long crawlers give it plenty of bearing area for stability and maneuverability on soft footing. Tandem mounted drums give maximum cable capacity. These plus Lima's quality "extras" (see right) have made the Type 2400 a hands-down favorite with users around the world.

Get the full story on the quality-built Type 2400 today. See your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-type dirt seal rings and retainers in crawler rollers.
2. Moving parts are flame or induction hardened for longer life.
3. Two-shoe swing and propel clutches; air control.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (standard equipment).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (½ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

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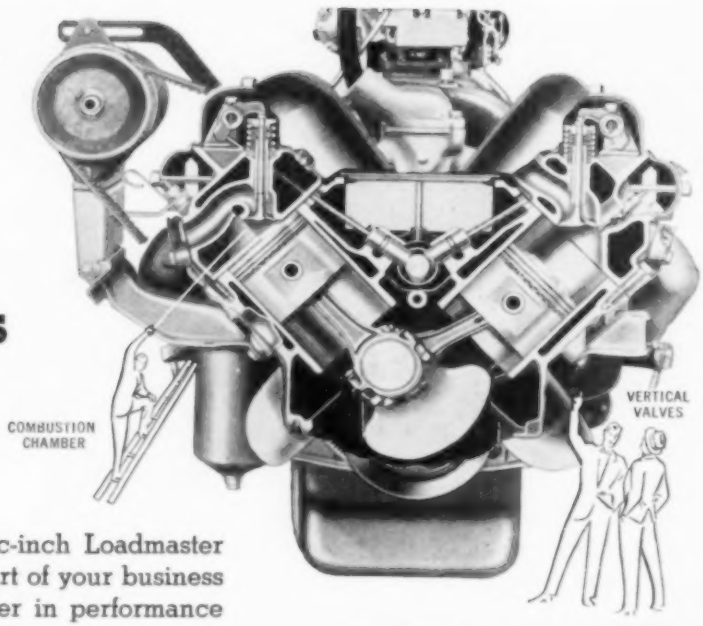
Construction Equipment Division · LIMA · OHIO · U. S. A.

Take a look inside the truck industry's newest V8!

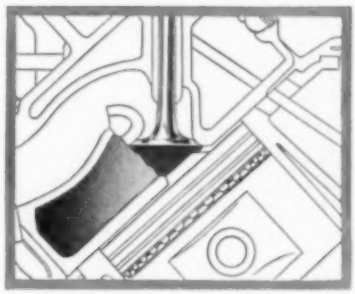


It's Chevrolet's new 322-cubic-inch Loadmaster V8 . . . and if big trucks are part of your business you'll find it has plenty to offer in performance and economy!

What you see inside that new V8 is *modern* engine design at its best! The new Loadmaster is a true heavy-duty load puller, with 310 ft. lbs. of torque and a fuel-saving compression ratio of 7.7 to 1. Extra-rugged components work together with perfected precision to produce 195 h.p.—plenty of reserve power to ease your toughest pulls!

Evidence of great engineering is everywhere in this most powerful of all Chevy truck engines. It offers the *shortest stroke* of any engine in its class; thus, engine wear is minimized, good economy assured. And it's the most compact of big-truck engines—delivers highest horsepower per pound. That's proof of *more efficient* design. Spark plugs are mounted centrally in the inverted "V" combustion chamber to give maximum heavy-duty power on regular fuel. Advanced features such as hydraulic valve lifters, chrome-plated top ring, and full-flow oil filter mean longer engine life with less maintenance expense!

And there are many, *many* such reasons why you'll do better with this new load-pulling champ under the hood! For all the facts, see your Chevrolet dealer. . . . Chevrolet Division of General Motors, Detroit 2, Mich.



Vertically mounted valves give high fuel-air turbulence during the compression stroke . . . you get maximum power from every drop of fuel!

Feature after feature proves why these big new Chevies are the work champs of the heavyweight class! New triple-torque tandem axle option lifts G.V.W.'s to 32,000 lbs. . . . G.C.W.'s to 50,000 lbs.! New frame is 25 percent heavier to stand up to your *tough* jobs. Easy, safe hauling stems from modern Ball-Race steering with bigger, stronger steering assembly. Exclusive new Powermatic transmission saves work, reduces truck wear like nothing else. No other trucks give you *so much*.

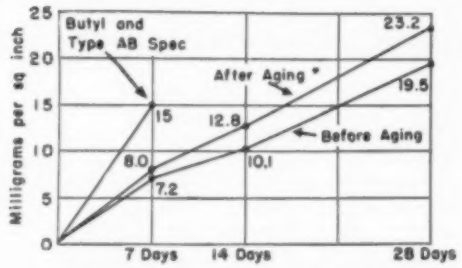
CHEVROLET

New Chevrolet Task·Force Trucks

Anything less is an old-fashioned truck!

Up out of harm's way, Anaconda 250MCM, 13,000-volt, grounded neutral, butyl-insulated, shielded, neoprene-jacketed cable delivers more power at lower cost to mine face in Colorado operation.

Go up to bring costs down – with Anaconda Mine Power Cable



Exceptional moisture resistance is provided by Anaconda Type AB butyl insulation, tests show. Type AB absorbs less than half as much moisture after 7 days as specifications permit.

With the trend to higher voltages in the mine – many companies are finding they can bring costs down by using overhead Anaconda butyl-insulated cable.

Cable is out of the way of damage by equipment, is easier to move, better for re-use. And there's no ditch to dig or fill, leaving a solid floor.

Even where moisture is a problem, you can outwit this enemy of long cable life with Anaconda butyl-insulated cable.

Latest tests show Anaconda's Type AB butyl high-voltage insulation absorbs far less moisture than industry standards permit . . . is many times better than competitive materials. And – Type AB's higher tensile strength gives you a stronger, sturdier cable.

New Engineering Bulletin EB-27 has full details on performance of Type AB insulation in 15 Industry Specifications tests. Ask the Man from Anaconda for your copy as well as information about Anaconda Aerial Cable. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

56330

SEE YOUR **ANACONDA®**

DISTRIBUTOR FOR **MINE POWER CABLE**

"CONTINUOUS" HAULAGE

FOR "CONTINUOUS" MINING

ENTERPRISE HAULAGE EQUIPMENT

MINE CARS (4-Axle Cars, Thru-Axle Cars, 8-Wheel Cars)

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- Side Dump Cars
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"Your cars custom-engineered for your specific needs"

ENTERPRISE WHEEL & CAR CORPORATION

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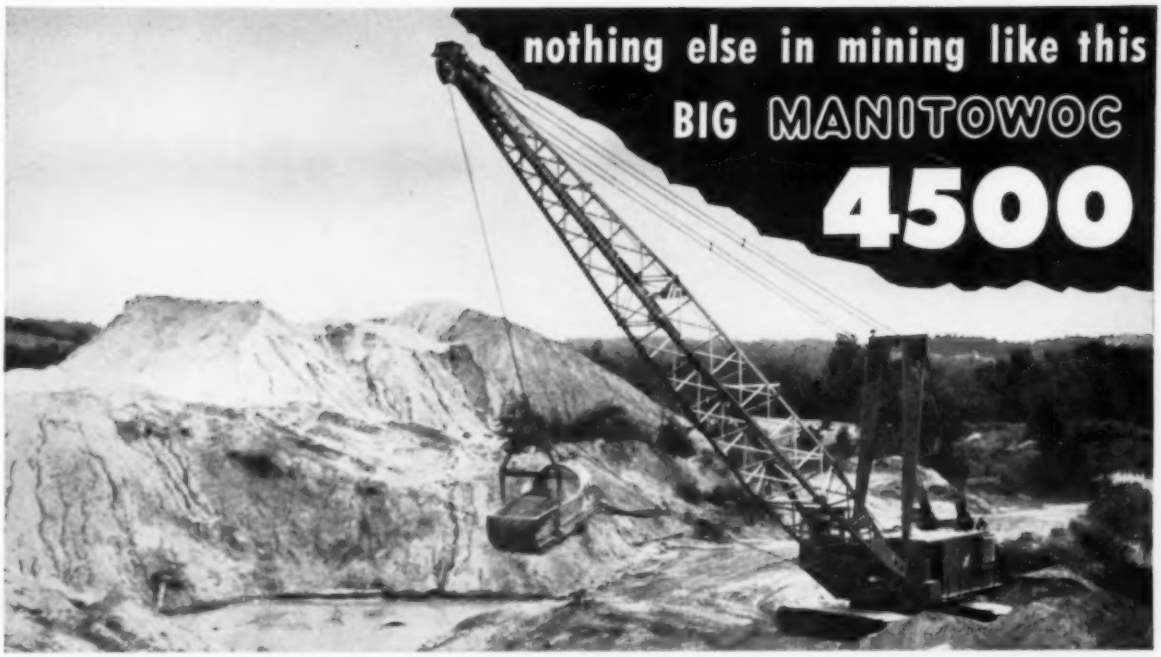


Little downtime with great capacity is the record set by this 4500 dragline mining limonite ore for U. S. Pipe and Foundry Company near Russellville, Ala.

There's no place for undersized, underpowered mining machines when you're aiming for more production per man hour. That's why the husky Manitowoc 4500 is today's "greater output" champ among mining operators.

United States Pipe and Foundry Company of Birmingham, Ala., use two 4500 draglines equipped with 140′ booms and 4 yd. buckets for mining limonite ore. Satisfactory performance from three Manitowoc 2-yd. shovels led to their choice of the larger 4500 machines. Top capacity with little downtime for all five units, is due to Manitowoc's simple design and superior construction.

TOP DESIGN FEATURES MAKE A TRUE MINING MACHINE

GREATER SIMPLICITY OF DESIGN directs more power to the dipper or bucket. Only four main shafts — only 15 gears — only working gears turn.

GAS OR DIESEL UNIT DRIVE effectively utilizes power — eliminates thousands of electrical wires and components. Full power can be applied to any operating function with less dead weight than is found in electric machines. Greater mobility — no restrictive electrical cables.

EXCEPTIONAL STABILITY assures top capacity. Massive carbody, adequate counterweight and long, wide crawlers let you reach way out with full safety and low ground bearing pressures.

SPECIAL HI-LIFT SHOVEL BOOMS available in two lengths — 60′ boom with 45′ tubular stick and 50′ boom with 37′ stick.

POWER-SMOOTH TORQUE CONVERTER, pioneered in power shovel application by Manitowoc, multiplies engine torque three times. Efficiency is increased and engine life extended. With engine power balanced to the load, engine **cannot stall — cannot be overloaded.** Make the Manitowoc 4500 your next mining machine. Send today for your free copy of the new 20 page Model 4500 illustrated catalog — no obligation!

Air-operated controls and clear, unobstructed view from large comfortable cab help 4500 operator do a better job.

MANITOWOC
SHOVELS 1-5½ YD. Speed Crane CRANES 20-100 TON

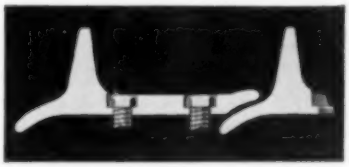
MANITOWOC ENGINEERING CORP.
Manitowoc, Wis.

Switch to extra-tough AMSCO® MANGANESE STEEL TRACTOR SHOES

When the going is extra tough, as in rocky areas or abrasive mineral soils . . . tractor shoe replacement can become a major cost item. Both repair time and down time eat up profits.

Switch to "the toughest steel known" . . . Amsco Manganese Steel . . . for tracks and grouser bars. Check their much longer service life against the moderate extra cost. Add to this the greater efficiency and pulling power of your tractor, over a longer period of time. The answer: *important operating economies.*

Amsco Manganese Steel gives excellent resistance to abrasion accompanied by impact . . . actually *work-hardens* in use. Write for full information on long-wearing Amsco Manganese Steel Tractor Shoes—the economical answer to high track-replacement costs.



COUNTER-SUNK BOLT HOLES

Amsco Track Shoes have holes counter-sunk for less wear on bolts. Saves cost of replacing bolts when changing shoes.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC

Suspended magnet gives you cleaner coal on conveyor belts traveling up to 600 fpm — *and faster*

A Stearns rectangular suspended separation magnet gives you maximum tramp iron removal — even on heavily loaded, unusually fast conveyor lines.

The Stearns rectangular magnet design permits its powerful, deep penetrating magnetic force to effectively remove tramp iron from entire width and depth of material burden — even at belt speeds in excess of 600 fpm. This magnet operates efficiently where other types of equipment can't do the job.

Greater Flexibility

Stearns suspended magnet overcomes space limitations because it can be placed over the head pulley, or anywhere along the belt. Sometimes it's set up to remove tramp iron before coal moves onto the conveyor — thus safeguarding the belt and other processing equipment from damage.

Stearns suspended magnets are economical to install and operate — no need to modify existing conveyor installations.

Custom-Built

Magnetic specialists at Stearns design and build rectangular or circular suspended magnets, electro or permanent magnetic pulleys in standard sizes, or to your individual specifications. Get complete details from your Stearns representative or write for bulletin 25D.

Check these advantages

- *All-welded, moisture-proof construction*
- *No moving parts that require replacement*
- *Single-coil construction for magnetic field stability*
- *Suspension cables, where required, let you change magnet's angle of inclination quickly*
- *Vacuum-impregnated windings for long life, dependable operation*

1153

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 661 S. 28th St., Milwaukee 46, Wis.

HAVE YOUR COAL TEST-CLEANED in the modern R&S Pilot Plant

THIS modern R&S pilot preparation plant lets you take the guess-work out of coal cleaning. Using a full carload sample, with full size equipment, under actual operating conditions, it shows exactly what R&S equipment can do for your coal. At the end of the process all end products are analyzed by an outside, unbiased laboratory—Commercial Testing and Engineering Co. You get their full report in writing, plus the recommendations of R&S coal preparation specialists.

Write for your free copy of the new Pilot Plant Bulletin that tells the full story.

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Subsidiary of Thompson-Starrett Company, Inc.

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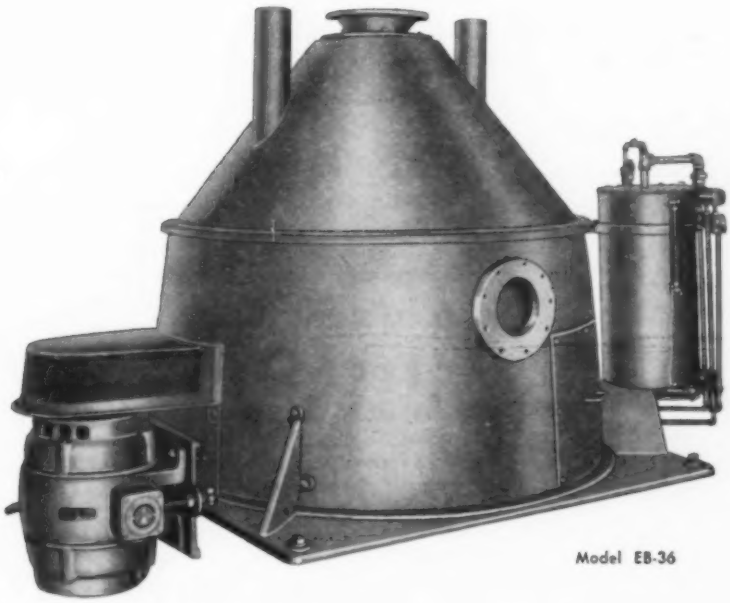
C·M·I

CONTINUOUS CENTRIFUGAL



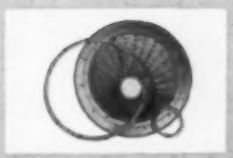
Model EB-36

Economy and efficiency are combined to make C·M·I Centrifugal Dryers leaders in their field. The unprecedented basket design of this dryer provides greater capacity together with economy of operation. The coal is dried to a 6% surface moisture content without the use of expensive heat-drying operations. Increased resistance to shock loads is provided by the new V-belt direct drive, while clogging, and resulting clean-out jobs, are nearly eliminated by an enlarged and improved discharge channel.

The new C·M·I dryer provides savings in daily operation expense in addition to low installation costs. For only a few cents a ton, this dryer will actually earn extra profits for you through the reclamation of marketable coal from slurry ponds. C·M·I welcomes the opportunity to assist you with your particular problems in this field.

Model EB-36 is compact, requires little space, little headroom.

The heart of Model EB-36 is the revolving basket and inner cone.



Metal clamping rings make it possible to replace worn out screens merely by loosening a few bolts — an exclusive feature.

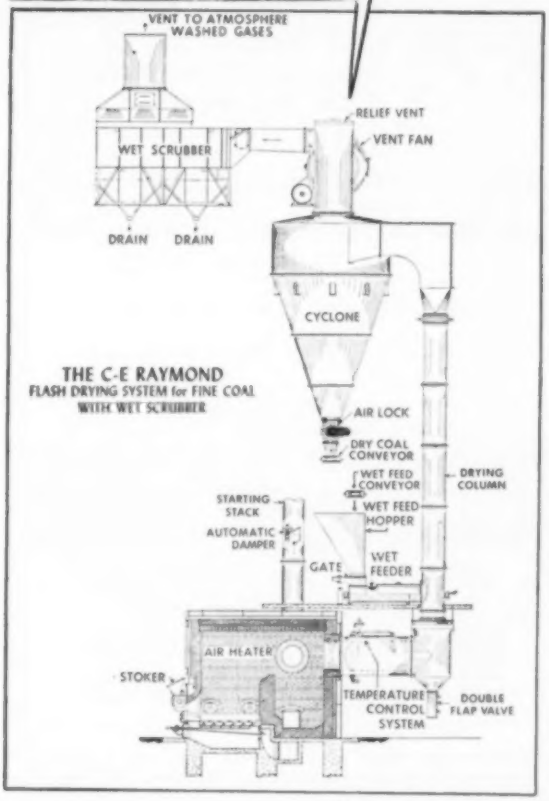
Production capacity assures prompt delivery of new equipment and replacement parts at all times.

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.

146 PRESIDENT STREET — SAINT LOUIS 18, MISSOURI

C·M·I Centrifugal DRYERS

THE C-E RAYMOND SYSTEM of FLASH DRYING FINE COAL



THE C-E RAYMOND
FLASH DRYING SYSTEM for FINE COAL
WITH WET SCRUBBER

Typical Flow Sheet for C-E Raymond Flash Drying System showing arrangement of units with air heater and wet scrubber.

C-E Raymond Flash Drying offers a rapid and economical method of removing moisture from fine coal ⅜″ x 0, and providing an effective venting system that meets smoke control regulations.

For Large and Small Plants — Complete units are built for any capacity requirements. With a single drying column, 10 to 100 tons per hour of dried product can be handled. Multiple drying columns connected to one furnace are furnished to order for larger capacities.

Highly Efficent Operation — Instantaneous drying action and new type coal trap combine to eliminate coal degradation problem even in softer coals. Smooth, clean, automatic operation with low power consumption is a feature of this system.

Control of Air Pollution — Where the plant location is in a restricted area, a high efficiency *wet scrubber* is included. Dust loss in venting the air will not exceed 0.3 grains per cubic foot, which is well within the range of air pollution requirements.

Practical Advantages — Units of equipment are easy to install, and may be arranged to fit plant layout without major alterations. Close control is assured over final moisture content of the coal. The unit will handle dewatered fines, containing 25% to 6% moisture, and deliver a dried product with only 2% to 3% moisture.

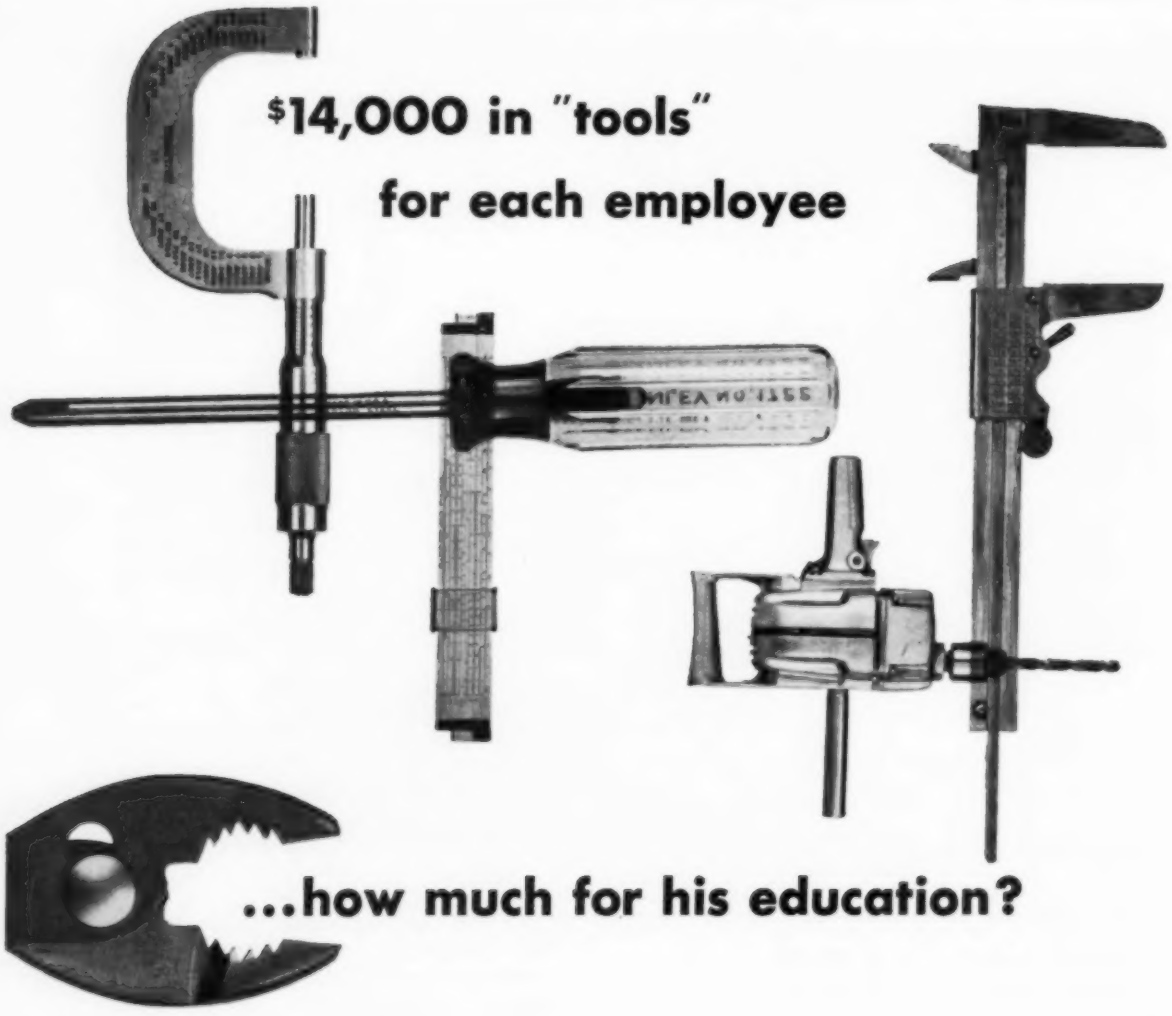
Write for our Bulletin of C-E Raymond Flash Drying Systems for handling fine coal.

COMBUSTION ENGINEERING, INC.
Raymond Division

1315 NORTH BRANCH ST.,
CHICAGO 22, ILLINOIS

SALES OFFICES IN PRINCIPAL CITIES

Combustion Engineering-Superheater, Ltd., Montreal, Canada



$14,000 in "tools" for each employee

...how much for his education?

Today, business invests an average of $14,000 in each employee's job. The question for businessmen is: Are we training enough people who can hold down these jobs? Schools are the answer. And it's simple self interest to help community groups get the teachers and equipment schools need. Shortage right now: 200,000 classrooms, 165,000 teachers!

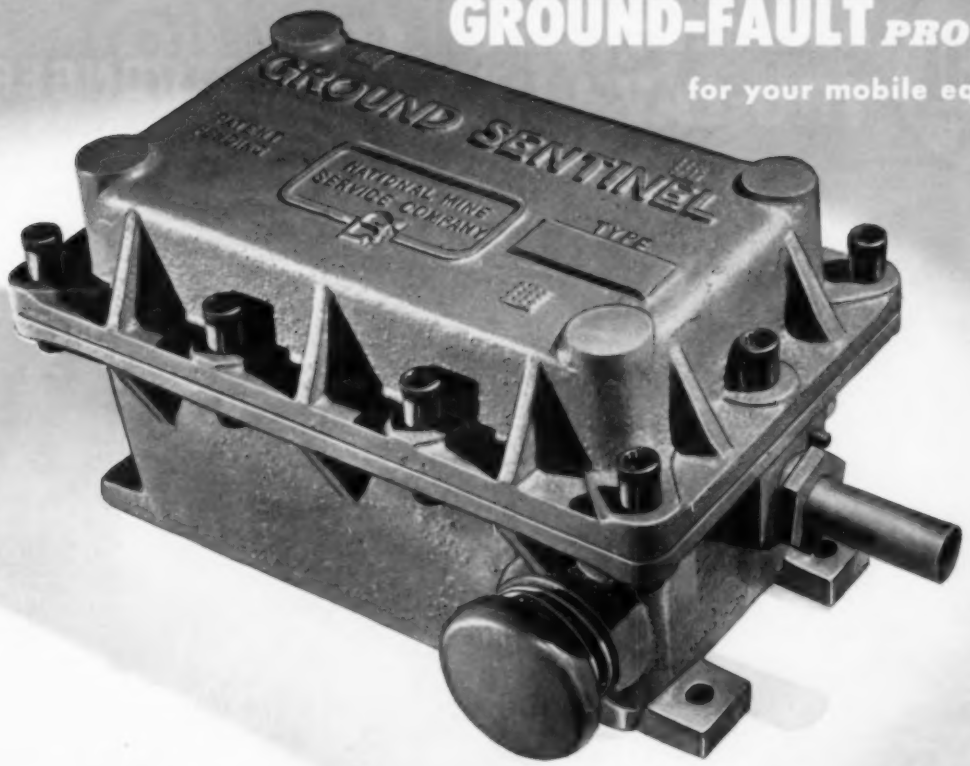
PUBLIC SERVICE ADVERTISING COUNCIL

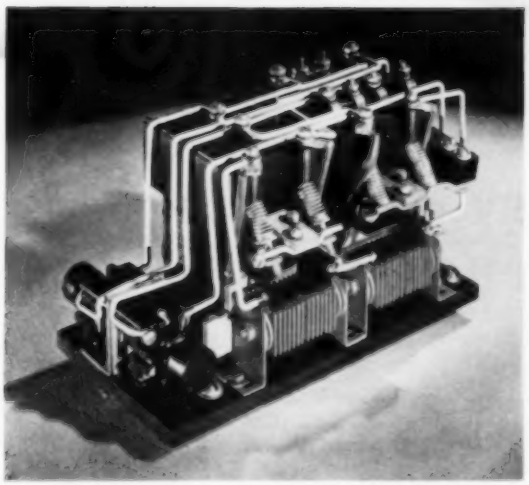
Want to find out how to help in *your* community?
Get specific information by writing:
Better Schools, 9 East 40th Street, New York, N. Y.

NOW—SAFE, ECONOMICAL

GROUND-FAULT *PROTECTION*

for your mobile equipment!





Certified by the U. S. Bureau of Mines
File x/p 700

The NEW NATIONAL MINE *GROUND SENTINEL*

Meeting every requirement for safe, effective, and dependable performance, the National Mine GROUND SENTINEL provides constant protection against ground-fault hazards for your mobile, off-track mining equipment. Compact, self-contained in an explosion-proof, heavy steel case, the Sentinel instantly shuts down the machine and opens all control circuits in event of insulation failure—guards against shock hazards through differences of potential between frames of adjacent equipment or equipment and ground – protects against ignition hazards resulting from transfer of electric currents between frames of equipment operating near working surface. Write today for the GROUND SENTINEL facts!

National Mine Service Company

has the facilities—delivers the goods

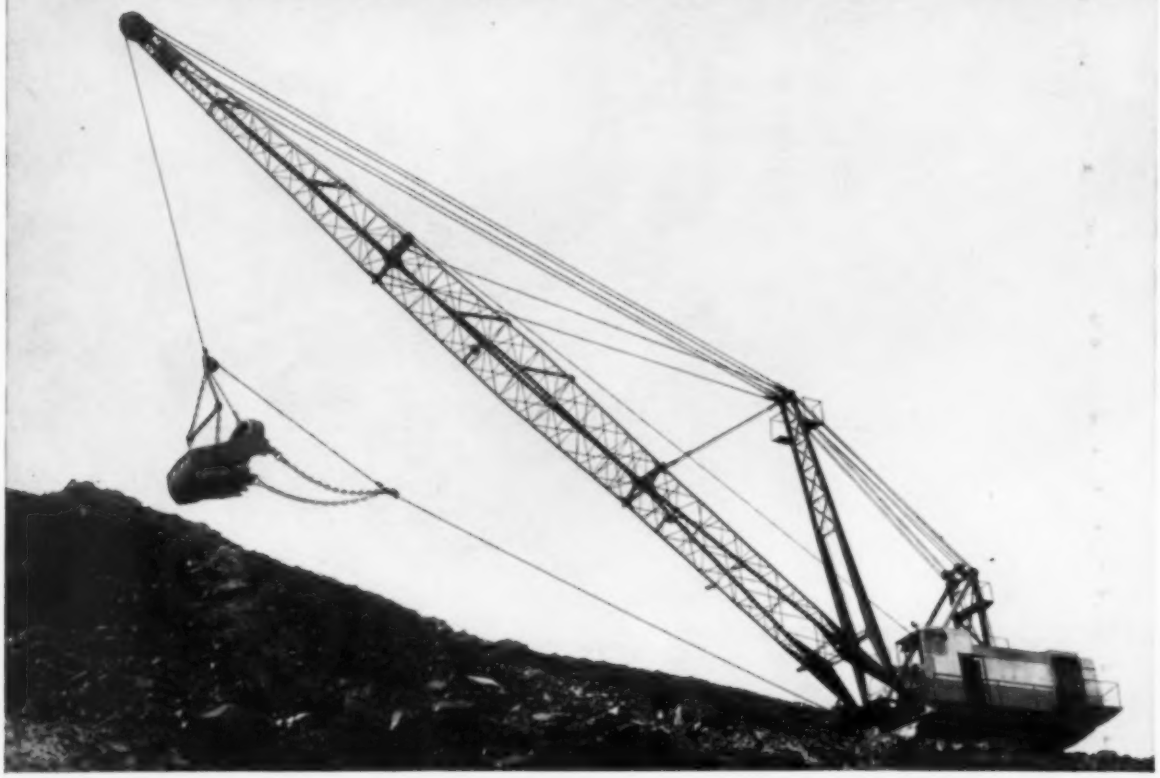
564 ALCOA BUILDING,
PITTSBURGH 19, PA.

7 Plants to Serve You

- ASHLAND DIVISION, Ashland, Ky.
- BEMECO DIVISION, Beckley, W. Va.
- WHITEMAN DIVISION, Indiana, Pa.
- ANTHRACITE DIVISION, Forty Fort, Pa.
- ALL-STATE DIVISION, Logan, W. Va.
- KY.-VA. DIVISION, Jenkins, Ky.
- WESTERN KY. DIVISION, Madisonville, Ky.

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER



57% Longer Life with New VHS Dragline

Draglines take a real beating in the coal stripping operations of the C B & M Coal Company, Plains, Pennsylvania. Used for removing over-burden, the best Improved Plow Steel draglines lasted 525 hours. When new TRU-LAY VHS draglines were used they established service records of 825 hours—57% better than Improved Plow Steel.

Entirely New Grade

VHS is setting similar service records on Draglines all over the country. Made from a new grade of steel for wire rope, new VHS is at least 15% stronger than Improved Plow Steel, the strongest grade available before VHS. This means you can handle heavier loads with the same diameter line. And you get a higher factor of safety.

For Slusher Ropes, Shovel Hoist Ropes, Winch Lines

New VHS is also tougher . . . resists abrasion . . . cannot become "hide-bound" or lose its flexibility. Developed especially for use as slusher ropes, draglines, shovel hoist ropes, and winch lines, it stands up better in these toughest services.

Cuts "Down Time"—Saves Money

In addition to longer life, new VHS cuts costly "down time" of equipment for wire rope replacement. This can mean savings.

At Your Distributor Now

Your American Cable distributor has draglines, slusher ropes, shovel hoist ropes, and winch lines of new VHS in stock now. Just call him and tell him the size and length you want. You don't need any complicated specifications.

See your American Cable Distributor or write to the nearest American Chain & Cable Company Office

ACCO American Cable Division

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INFORMATION:
DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals). EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page.

DISPLAYED RATE:
The advertising rate is $10.20 per inch for Equipment and Business Opportunity advertising appearing on other than a contract basis. Contract rates quoted on request.

EMPLOYMENT OPPORTUNITIES—$12.80 per inch, subject to agency commission.

NEW ADVERTISEMENTS: Address N.Y. office, 330 W. 42nd St., N.Y. 36, for June issue. Closing May 18th.

BEST FOR LESS

LOCOMOTIVES — LIKE NEW

4—20-ton G.E. Tandem Locomotives, each consists of two 10-ton GHM-848A1, 250 V Locomotives, with contactor controls, hydraulic brakes, dynamic braking, sanders, equalizers, new in 1950. Will change to any gauge.
2—20-ton Jeffrey MH-77, 250 V, complete with air brakes, sanders, contactor controls, equalizers. Now 42" gauge. Very late type. Will change to any gauge.
5—15-ton Jeffrey MH-77.
4—15-ton Jeffrey MH-110.
3—10-ton Jeffrey MH-143.
1—10-ton West. 927-LD.
10—8-ton Jeffrey MH-100.
Completely rebuilt by efficient electricians and mechanics with years of experience.
3—300 KW G.E. Rotary Converters, Type HCC-6, Form P, 1200, 250/275 V, complete with switchboards, switchgear, 1600 amp. I-T-E automatic reclosing breakers.
3—200 KW G.E. Syn. Rotary Converters, Type HCC-6, Form P, 1200, 250/275 V, switchboards and all necessary switchgear, including 1200 amp. I-T-E breakers.

Above converters all equipped with three single phase, 60 cycle transformers, 2300/4000 V AC.
3—300 KW Westinghouse M.G. Sets, 250/275 V, 3 phase, 60 cycle, 2300 V, 1200 speed, complete with switchboards and all necessary switchgear.
2—200 KW G.E. M.G. Sets, 250/275 V, 1200, 2300 V AC, complete with all necessary switchgear.
1—500 KW Westinghouse M.G. Set, 250/275 V DC, 1200 RPM, 3 phase, 60 cycle, 2300 V, complete with all necessary switchgear.
1—3JCM-2BE Joy Continuous Miner, permissible, 250 V.
1—Marietta Miner, #5325, practically new, 250 V, permissible.
4—Late type 660-BH Goodman Loading Machines, 34" high, full hydraulic, permissible.
4—42E-9 Jay Shuttle Cars.
2—5-SC Joy Shuttle Cars.
5—6-SC-5AE Joy Shuttle Cars.
5—Jeffrey 29-U Cutting Machines, late type, permissible.

All type Loading and Cutting Machines, Shuttle Cars, Rotary Dump and Drop Bottom steel Mine Cars, all gauges; Single and Double Drum Hoists for all purposes, with 100 to 1200 HP motors.
WANTED: Will pay spot cash for 14-BU, 8-BU, and 11-BU Joy Loading Machines, 5-SC and 6-SC Shuttle Cars.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

FRANK J. WOLFE PHONE L.D. 34 SHELDON J. WOLFE
TERRE HAUTE, INDIANA

COAL MINE FOR SALE
$100,000,00

275 Acres — More Available

1. Located in the heart of industrial and domestic area—Beaver County, Pa.
2. 44" Upper Freeport Seam—Excellent steam and domestic fuel. 14,500 BTU Low ash.
3. Averaged ten tons per man thru 1955.
4. Excellent roof conditions and not a wet working place in the mine.
5. Equipped 100% mechanical with the following equipment:
   7 G-15 Goodman shaker conveyors
   6 #11½ Goodman automatic duckbills
   2 Goodman 412 cutting machines
   2 Goodman standard cutting machines
   24 three ton all steel mine cars — Excellent shape
   30 two and one-half ton mine cars — Fair shape
   6 hand held coal drills
   Thousands of feet of track and 4/0 copper feeder wire
   2 six ton haulage motors
   200 ton all steel tipple with shaker separating into five different sizes
   1 Fairbanks Morse Diesel-Generator set
   6 2200-440 transformers
   Many other items to numerable to mention
   Our present coal contracts included in this sale.

Write

COURTNEY COAL COMPANY
1100 Fifth Street Beaver, Pa.

REBUILT MINE EQUIPMENT

1—American Ring Pulvizer, Type 42B, 250 Ton Capacity per hour, direct connected to G. E. 100 H. P., 720 R.P.M., 220/440 Volt, Totally Enclosed Induction Motor. Excellent Condition.
3—G. E. 150 K V A Transformers, Voltage 2300-4160Y to 220/440.

DUGGER ELECTRIC EQUIPMENT CO.
Phone 121 or 42 Dugger, Ind. W. M. Hunley

"Edison"

ELECTRIC CAP LAMPS

Used, good rechargeable cond.

800—Model "P" $8 ea.
400—Model "K" $6 ea.

LAMP RECHARGING RACKS
Standard Charging $40 ea.
25—RHEOSTATS
250 volt, 2 amp. $20 ea.

MINERS SAFETY LAMPS
100—"Wolf" #100 $3 ea.

ELECTRIC TRIP LAMPS
45—Single Cell $5 ea.

F.O.B. Dalton, Pa.

PHILADELPHIA TRANSFORMER CO.
Box 566 Dalton, Pa.

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42" Gauge Mine Cars
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(C) 2—32E7 Joy Shuttle Cars
(W) 4—32D Joy Battery Cars—Complete
(C) 1—Lee Norse Shuttle Car
(W) 1—T2-5PG, 220/440 Volt AC Cat Trucks
(C) 1—Goodman 665 Cat Mounted Loader
(C) 1—Goodman 360 Track Mounted Loader
(C) 1—1224 Goodman Cutter, Rubber Mounted
(W) 2—32E10 Shuttle Cars
(W) 1—T2-5, 250 Volt DC Cat Truck
(W) 2—60E Joy Shuttle Cars
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CONVEYORS

(W) 2—95A Goodman Belt Conveyors, 24" Wide, approximately 1000' Centers, complete less belt
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(C&W) 5—12AB Standard Goodmans, 35 h.p.
(W) 6—212AA Baby Goodmans
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(W) 2—312, 220/440 Volt AC Goodmans
(C) 1—712 Goodman
(C&W) 20—35B & 35BB Jeffrey, As Is or Rebuilt
(W) 4—35L Jeffrey, 50 h.p., Permissible
(C&W) 4—7AU Sullivans
(W) 2—7B Sullivans, 220/440 Volt
(C&W) 12—Sets Trucks for 12AA, 212AA, and 35B Machines
(W) 1—29U Jeffrey, 42" t.g.

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(W) 2—MH110 Jeffrey, 36" t.g.
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(W) 2—HM803 GE 42" t.g.
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(W) 1—18"x42' Belt Conveyor
(W) 1—18"x75' Belt Conveyor
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(W) 9—HKL Brown Fayro Car Spotting Hoist
(W) 1—3000KW GE Rectifier
(W) 1—200KW West. Rotary, 2300/4000Y
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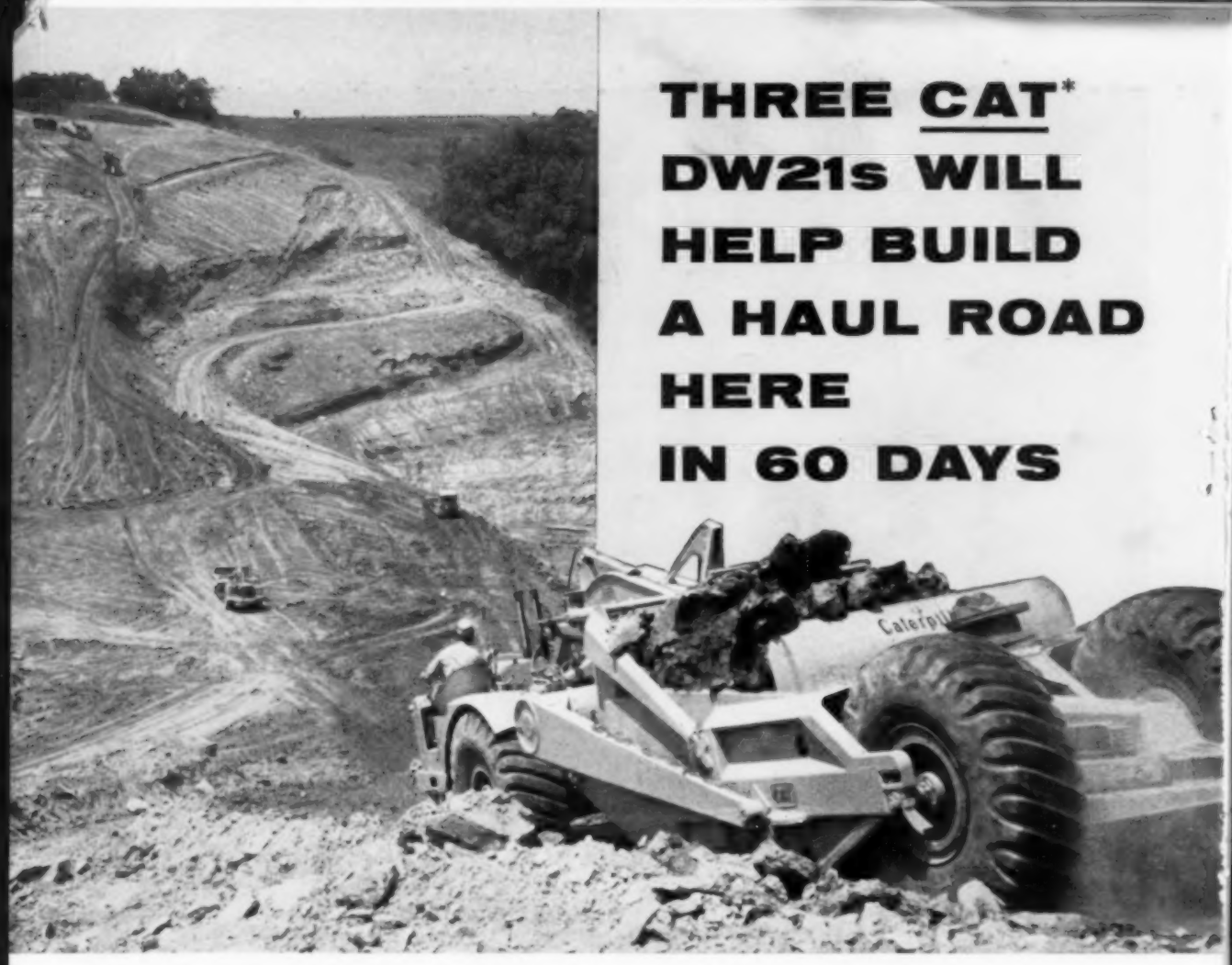

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